



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



HARVARD UNIVERSITY

**GRADUATE SCHOOL
OF BUSINESS
ADMINISTRATION**

BAKER LIBRARY



STONE & WEBSTER

JOURNAL

VOLUME 20
JANUARY-JUNE 1917

BOSTON
STONE & WEBSTER
147 Milk Street

1620

Apr. 13, 1933

AT.9

S88

V.20

06853-S

INDEXES TO VOL. 20, JANUARY-JUNE, 1917

Subjects	:	:	:	:	:	:	iii	Illustrations	:	:	:	:	:	:	xii
Authors	:	:	:	:	:	:	xi	Library Notes	:	:	:	:	:	:	xiii

N. B. The following page-numbers of each issue of the Stone & Webster Journal in this volume are given for convenience in referring to unbound copies:

pp. 1-84.....	Jan.	pp. 249-328.....	April
" 85-168.....	Feb.	" 329-408.....	May
" 169-248.....	March	" 409-488.....	June

SUBJECT INDEX

(Ed.)=editorial; (r)=review; *=illustrated. The page scope is given for articles extending over more than two pages. Names of authors are enclosed in parentheses.

ACCESSIONS to the library of Stone & Webster, 82, 166, 246, 325, 406, 486

Aeronautic station, Pensacola, Fla., 70, 154; Jacksonville, Fla., 68

Alafamiss advertising campaign, 154

Allen, C. S., attached to Buzzard's Bay Electric Co., 389

Allen, James B., transferred to Boston office, 309

Allison, James E., memoir, 398

Ambulance experiences in France, *180-187

American International Corporation, preliminary report of the president (r), 79

Amsterdam, N. Y., business conditions, 134, 217, 375, 460

Appropriation bills, The president and (ed.), 170

Army, see Military service; War

Associations, see Clubs

Aviation

BALLSTON SPA, N. Y., business conditions, 134, 217, 375, 460

Bank clearings and deposits in Stone & Webster localities, 57, 134, 217, 297, 375, 460

Banquets: dinner for S. L. Shuffleton at Buffalo, N. Y., 63; dinner of Stone & Webster Club of Washington at Seattle, Wash., 149; dinner of New York office force, 230; dinner for Greater Iowa Association at Keokuk, Ia., 234; dinner of department heads of Beaumont and Port Arthur companies at Beaumont, Tex., 389

Baton Rouge, La.: business conditions, 297, 375; office news, 147, 230, 308, 387, 473

Bay State Street Railway, demand for a decision relative to a six-cent fare on, 410

Beaumont, Tex.: business conditions, 134, 375, 460; office news, 388

Belgian children (J. W. Hallowell), 255-264, (ed.), 250-252

Bellingham, Wash.: business conditions, 135, 217, 297, 461; office news, 148

Betterment work applied to a steam power station (W. H. Blood), 32-38
 Bibliographies, see Library Notes Index
 Bird, Walter M., transferred to Tampa office, 157
 Blackstone Valley Gas & Electric Employees' Association, 73, 153, 239, 315
 Blankenship, Arthur E., transferred to Tampa office, 157
 Bonds, Principles of public utility financing by means of (L. R. Nash), 352
 Books, see Accessions, Library Notes Index
 Boston, Mass., office news, 63, 147, 230, 307, 387, 473
 Bowes, Joseph, Jr., transferred to Port Arthur office, 398
 Bowling: Lowell office, 312; Pensacola office, 70, 71, 155, 397; Woonsocket office, 240, 315
 Bradford, K. L., transferred to El Paso office, 390
 Bragg, Lester M., transferred to Key West office, 69
 Brazil, impressions from travel in (I. W. McConnell), *190-198
 Brockton, Mass.: business conditions, 57, 135, 218, 298, 376, 461; office news, 389; population, 376
 Business conditions in Stone & Webster localities, 57, 134, 217, 297, 375, 460

CAMPBELL, BUSHROD H., attached to Boston office, 230

Camps, see Military service
 Canastota, N. Y., business conditions, 134, 218, 462
 Canton, Mass., business conditions, 57, 299, 376
 Cape Breton, N. S., see Sydney
 Car Men's Club, Keokuk, Ia., 311, 395
 Carothers, S. W., appointed superintendent of Dallas City Light Company, 149
 Carpenter, Henry H., transferred to Woonsocket office, 473
 Carroll, Raymond G., appointed manager of The Key West Electric Company, 69
 Chattahoochee River water power and its influence on manufacturing (G. K. Hutchins), 46-49
 Christmas tree, Seattle, Wash., 156
 Cleveland, Ohio, The truth about the municipal electric plant of (L. R. Nash), 103-125
 Clubs, see Blackstone Valley Gas & Electric Employees Association, Car Men's Club, Electric City Benefit Association, Electric Club of Washington, High Tension Club, Jacksonville Electric Company Benefit Association, Kiwanis Club, Red Cross, Safety First League, Special Libraries Association, Stone & Webster Club of Washington
 Coal mines, Utilising the waste from (Henry Hull), 363-367
 Collins, C. R., attached to Gray's Harbor Railway & Light Co., 238
 Columbus, Ga.: business conditions, 136, 218, 462; office news, 231, 474
 Columbus Power Company, development of water power on the Chattahoochee River by The (G. K. Hutchins), 47-49

SUBJECT INDEX

- Companies, news from the, 63, 147, 230, 307, 387, 473
Connecticut, see Middletown
Coupons and dividends due, 73, 159, 316, 400, 481
Coupon notes, Principles of public utility financing by means of (L. R. Nash), 352
Crom, George C., Jr., transferred to Boston office, 307
Cutler, P. W., attached to Buzzard's Bay Electric Co., 389
- DALLAS, TEXAS**, business conditions, 136, 219, 299, 376, 462
Dallas City, Ill., business conditions, 463
Davis, Edmund J., transferred to Beaumont office, 390
Davis, L. E., attached to Jacksonville office, 475
Deaths, see Necrology
Debt of the United States, The war and the (ed.), 252-254
Democracy and efficiency (I. N. Hollis), 280-290
Demurrage (Francis Brown), 42-44
Desmond Fitzgerald medal awarded to D. M. Wood, *307
Deter, Charles, transferred to Keokuk office, 235
Dinners, see Banquets
Dividends due, 13, 159, 141, 316, 400, 481
Dole, Charles E., transferred to Ponce office, 307
Dunnington, George, memoir, 398
- EASTMAN, HAROLD F.**, attached to Boston office, 63
Edwards, F., transferred to Houghton office, 240
Efficiency and democracy (I. N. Hollis), 280-290
Eldridge, H. C., transferred to Lowell office, 153
Electric City Benefit Association, 232
Electric Club of Washington, 71, 238
Electric lighting plant, Cleveland, Ohio, The truth about the (L. R. Nash), 103-125
Electric power: New uses for electricity (G. E. Tripp), 50-53; Relation of the electric steel furnace to central station supply (N. T. Wilcox), 273-277; Electricity in modern printing, *450-459
El Paso, Tex.: business conditions, 219, 299; office news, 390
Emery, Lorenzo W., transferred to Galveston office, 236, 390
Engineer, Civilization's debt to the (A. A. Packard), 214
Enlistment: the problem of technical men (ed.), 249; The Stone & Webster organization and the war, 295, 387, 390, 391, 396, 474, 475, 477, 473, 479, 480
Esty, Edward S., transferred to New London office, 387
Everett, Wash., business conditions, 136, 220, 299, 377, 463
- FALL RIVER, MASS.**, business conditions, 57, 137, 220, 377, 463
Federal control of rates the desirable policy (ed.), 5-8
Fernald, Thomas W., transferred to Boston office, 236
Financing, Principles of public utility (L. R. Nash), 351-362
Firing boilers, outline of system for (W. H. Blood), 34

Flahive, Frank B., appointed manager of Fort Madison Electric Co., 390
 Florida, see Jacksonville, Key West, Pensacola, Tampa
 Forbush, Robert L., transferred to Cape Breton Electric Co., 153
 Forestry in the United States (R. H. Bolster), *440-449
 Fort Madison, Ia.: business conditions, 58, 137, 220, 300, 378, 463;
 office news, 149, 233, 308
 Fort Worth, Tex., business conditions, 137, 221, 300, 378, 464; office
 news, 149, 390
 Fourth of July casualties decreasing (ed.), 409
 Freight rates between Shreveport, La., and western localities (ed.), 5-8
 Fuller, R. S., transferred to Pensacola office, 396

GALLAHER, J. E., transferred to Houghton County Traction Co., 150
 Galveston, Tex.: business conditions, 58, 138, 221, 301, 380, 464;
 office news, 390, 474
 Gas industry stimulated by electrical competition, 34; Centralization
 of gas production (C. W. Hunter), 175-179
 Georgia, see Columbus, Savannah
 Gibbon, Arthur G., appointed superintendent of Fort Madison Elec-
 tric Co., 149
 Glens Falls, N. Y., business conditions, 138, 222, 380, 465
 Gordon, Alvin W., transferred to Canton office, 147
 Government, Efficiency under a democratic (I. N. Hollis), 280-290
 Government ownership as exemplified by the Cleveland municipal
 electric plant (L. R. Nash), 103-125 (ed.), 85
 Griffiths, Richard E., memoir, 309

HALLOWELL, JOHN W., appointed chairman of the Committee on
 Supplementary Rations of the New England Belgian Relief Fund,
 307
 Harford, C. U., transferred to Haverhill office, 153
 Harisberger, John, appointed to a captaincy in Reserve Army Corps
 of Electrical Engineers, 314
 Haverhill, Mass., business conditions, 59, 139, 222, 301, 380, 465
 High Tension Club, Keokuk, Ia., 68, 152, 234, 310, 393, 476
 Holding company, The public utility (G. E. Claffin), 424-439
 Hobbies (G. W. Lee), 209-213
 Hoover and the Belgian children (ed.), 250-252 (J. W. Hallowell),
 255-264
 Hopkins, Fred L., transferred to Boston office, 147
 Houghton, Mich.: business conditions, 139, 222, 301, 465; office news,
 150, 391
 Houston, Tex.: business conditions, 59, 139, 222, 302, 381, 465; office
 news, 391
 Howell, Lenwood N., removed to Maryville, Tenn., 388
 Huff, John, enlisted in the army, 474
 Hunter, William A., transferred to Middletown, Conn., 237

SUBJECT INDEX

vii

ILLINOIS, see Dallas City

Interstate Commerce Commission should have general control over interstate and intrastate rates as indicated by the Shreveport case (ed.), 58

Iowa, see Fort Madison, Keokuk

JACKSONVILLE, FLA.: business conditions, 59, 223; office news, 67, 151, 233, 308, 392, 475

Jacksonville Electric Company Benefit Association: annual election, 67; co-operative store, 475

Jitney omnibuses forbidden to operate on certain streets in Fort Worth, Tex., 150

KELLY, JOHN W., transferred to Key West office, 312

Kentucky, see Paducah

Keokuk, Ia.: business conditions, 60, 140, 223, 302, 380, 466; office news, 68, 151, 234, 310, 393, 476; inspection of possible sites for armor plate plant, 310

Key West, Fla.: business conditions, 60, 140, 223, 302, 380, 466; office news, 69, 152, 235, 311, 395, 477

Kimball, Clayton R., resigned from Lowell Electric Light Co., 396

Kirkland, Rabb N., transferred to Paducah office, 147

Kiwanis Club, Woonsocket, 315

Knapp, Lester H., transferred to Houghton County Electric Light Co., 68, 150

LABOR, and universal service (I. N. Hollis), 280-290

Labor monopoly, G. S. Beeby on danger in (ed.), 169

Lake George, N. Y., business conditions, 140, 234, 466

Lane, Alden L., transferred to Lowell office, 153

Lannon, Thomas R., attached to Jacksonville office, 233

Latimer, William B., transferred to Middletown office, 154

Lee, Sydney T., transferred to Houston office, 237

Liberty Loan Club among members of the Boston office, 374

Library of Stone & Webster, see Accessions, Library Notes Index

Lowd, Mark, memoir, 330, 350

Lowell, Mass.: business conditions, 140, 224, 303, 380, 466; office news, 153, 236, 312, 396, 478

Loyalty parade, Brockton, 389

McLAUGHLIN, JAMES F., transferred to Beaumont office, 239

Massachusetts, see Boston, Brockton, Canton, Haverhill, Lowell, Plymouth

Massachusetts Institute of Technology, its part in preparedness (C. A. Stone), 39-41

Mayotte, Archie, attached to Consumers Power Co., Jackson, Mich., 391

Menke, B. H., attached to Connecticut Power Co., 395

Merrill, C. W., Sayre, attached to Boston office, 147

- Middletown, Conn., business conditions, 144
 Military service, Stone & Webster men in, 387, 390, 391, 396, 474, 475, 477, 478, 479, 480
 Mississippi River Power Co., see Keokuk, Ia.
 Moore, David, transferred to El Paso office, 154
 Municipal ownership in Seattle a failure, 368-371
- NECROLOGY:** James E. Allison, 398; George Dunnington, 398; Richard E. Griffiths, 309; Mark Lowd, 330, 350; James C. Woodsome, 372
 Neff, T. W., attached to Baton Rouge office, 231
 Nelson, Edwin E., transferred to Utica office of Adirondack Electric Power Corporation, 309
 Nelson, Earl H., transferred to Boston office, 147
 Nevado, see Reno
 New Bedford Gas & Edison Light Co., The economics of a power station exemplified by (Walter Goodenough), *335-350
 New York, see Amsterdam, Ballston Spa, Canastota, Glens Falls, Lake George, Oneida, Saratoga Springs, Watervliet
 New York, N. Y., office news, 230
 Newell, Paul, resigned from Keokuk office, 235
 News from Stone & Webster companies, 63, 147, 230, 307, 387, 473
 Nichols, Alfred S., appointed manager of Paducah Traction and Light Co., 396
 Nitrates, how to secure a large supply of (Beta), 132
- OAKES, JOHN W.**, transferred to Washington for emergency work of the Red Cross, 307
 Ober, John Larcom, attached to Stone & Webster Engineering Corporation, 69
 Oneida, N. Y., business conditions, 141, 324, 381, 467
 Outing and barbecue of Columbus office, 232
- PACKARD, ANSEL A.**, transferred to New London office, 307
 Paducah, Ky.: business conditions, 60, 141, 224, 303, 381, 467; office news, 69, 153, 236, 396
 Parsloe, George S., transferred to Houghton office, 391
 Patriotic parade, Brockton, Mass., 389
 Patriotism, preparedness and prudence (ed.), 91
 Patterson, Edward L., attached to American International Corporation, New York, N. Y., 230
 Pawtucket, R. I.: business conditions, 60, 141, 225, 303, 381, 467; office news, 153
 Pensacola, Fla.: business conditions, 142, 225, 304, 382, 468; office news, 70, 154, 237, 313, 396, 478
 Perry, Edgar R., appointed a lieutenant in Reserve Army Corps of Electrical Engineers, 314
 Pike, Sumner T., transferred to Lowell office, 236
 Plymouth, Mass., business conditions, 382

SUBJECT INDEX

ix

- Ponce, P. R., business conditions, 225, 382, 468
Pork barrel, The president and the (ed.), 170
Port Arthur, Tex., business conditions, 142, 226, 304, 382, 468
Post office receipts in Stone & Webster localities, 57, 134, 217, 297, 375, 460
Power, see Electric power
Power station, The economics of a (Walter Goodenough), *335-350
Pratt, Joseph, attached to Boss Electric Supply Co., Providence, R. I., 316
Pratt, Ralph W., transferred to New London office, 473
Preparedness: Technology's part in preparedness (C. A. Stone), 39-41; Patriotism, preparedness and prudence (ed.), 91; Real preparedness for a nitrate supply (Beta), 132
Production, where delay is dangerous on account of need of increase in (ed.), 171
Public Safety Committee of Massachusetts, members of Stone & Webster organization included in, 307
Public utilities: Some problems in the operation of public utilities (W. H. Blood), 29-38; Principles of public utility financing (L. R. Nash), 351-362; Some ignored facts regarding public utility rates (ed.), 412; The war's effect on public utilities (H. G. Bradlee), 417-423; The public utility holding company (G. E. Claffin), 424-439
Puget Sound country, Impressions of the (E. S. Webster), 188

QUOTATIONS on securities of companies under Stone & Webster management, 75, 161, 243, 319, 402, 463

- RAILROADS: What shall we do with our railroads? (W. J. Cunningham), 9-21; The evolution of the railroad (F. J. Wood), *199-208; British and American methods of meeting rising railroad costs of operation, 410
Railways, The cost of urban transportation by the (Russell Robb), 54-56
Rates: profitable standard of rates imperilled by the value-of-service theory (ed.), 2; control of Interstate Commerce Commission over interstate rates of intrastate carriers established by Shreveport case (ed.), 5-8
Real estate operations in Stone & Webster localities, 57, 134, 217, 297, 375, 460
Red Cross: Eliot Wadsworth assumes direction of the Red Cross, 1; The real meaning of the Red Cross (F. J. Whiting), 22-28
Reno, Nev., business conditions, 142, 226, 468
Reynolds, Edward, Jr., transferred to Savannah office, 230
Road, see Railroad, Toll road
Rogers, Gardner, appointed manager of Woonsocket division of Blackstone Valley Gas & Electric Co., 150, 183, 239
Run-off data of New England compared (D. M. Wood), 126

SUBJECT INDEX

- SAFETY** Committee of the Seattle division, 486
 Safety Council No. 30 formed at Houston, 392
 Safety First League, Jacksonville, 68, 233
 Safety work in Tacoma schools (T. N. Berry), 291-294
 Saratoga Springs, N. Y., business conditions, 142, 226, 383, 469
 Savannah, Ga., business conditions, 61, 143, 227, 304, 383, 469; office news, 70, 154, 237, 397, 479
 Scientific management as applied to a public utility, limitations of (W. H. Blood), 29-38
 Securities of a public utility, Principles of issuing (L. R. Nash), 351-362
 Seattle, Wash.: business conditions, 61, 143, 227, 305, 383, 470; office news, 71, 155, 237, 313, 397, 479; failure of municipal ownership, 368-371
 Seattle's new era of ship construction (K. C. Kerr), *265-269
 Sharpless, Harry R., transferred to Baton Rouge office, 388
 Shepard, Ronald C., transferred to Boston office, 230, 311
 Shields, Walter C., transferred to Woonsocket office, 315
 Ship construction, Seattle's new era of (K. C. Kerr), *265-269
 Ships on Puget Sound, Wooden (Frank Dabney), *270-272
 Shreveport, La., rates case (ed.), 5-8
 Six-cent fare on Bay State Street Railway, demand for a decision regarding, 410
 Small, Thomas L., transferred to Savannah office, 147, 233
 Smith, Elander T., transferred to Columbus office, 232
 Smith, Montelle C., appointed manager of Brockton & Plymouth Street Railway Co., 230
 Smith, Walter J., transferred to Savannah office, 154
 Snyder, Otto, transferred to Glens Falls office, 150, 391
 Societies, see Clubs
 South American impressions (I. W. McConnell), *190-198
 Special Libraries Association meeting at New Haven, Conn., 77
 Speer, W. H., resigned from Columbus office, 233
 Steel furnace, electric (N. T. Wilcox), 273-279
 Stewart, Donald, transferred to New London office, 231
 Stocks of public utilities, principles of issue of (L. R. Nash), 351-362
 Stone & Webster Club of Washington, 71, 149, 237
 Stone & Webster construction contracts, 307, 308, 473
 Stone & Webster Liberty Loan Club, Boston office, 374
 Stone & Webster localities, 57, 134, 217, 297, 375, 460
 Stover, I. Maxwell, appointed manager of Baton Rouge Electric Co., 69, 231
 Sydney, N. S., business conditions, 62, 144, 227, 305, 384, 470
- TACOMA, WASH.:** business conditions, 144, 228, 305, 384, 474; office news, 156, 239, 314, 398
Tampa, Fla.: business conditions, 145, 228, 306, 385, 471; office news, 150, 314
 Tampa Electric Benefit Association, 157, 158

AUTHOR INDEX

xi

Taxation: of excess profits (ed.), 86; Contempt for the competent a cause of faulty methods of taxation, 129; desirability of increasing the income tax during the war (ed.), 250; The war taxes and industry (ed.), 333

Taylor, F. C., transferred to Tampa office, 388

Toll road—our first public utility (F. J. Wood), *93-102

Transportation situation, a ruinous public policy the cause of the present (ed.), 329

Treasurers in Boston, Mass., conference of assistant, 63

Turner, John W., attached to Boston office, 147

UNIVERSAL service for labor (I. N. Hollis), 280-290

WADSWORTH, ELIOT, assumed direction of the American Red Cross and retired from Stone & Webster, 1

War in Europe: Ambulance experiences in France, *180-187; The Stone & Webster organization and the war, 295; The war loan (ed.), 331; subscriptions to the war loan in Brockton, Mass., 462

Ware, Oliver F., transferred to Mississippi River Power Co., 149

Waterpower developments surprisingly few (G. K. Hutchins), 47-49

Watervliet, N. Y., business conditions, 145, 228, 386

Weston, W. Lawrence, appointed manager of Houghton companies, 391

Wilbur, Arthur A., transferred to Brockton office, 474

Williams, Paul R., transferred to Boston office, 147, 235

Wood, Dana M., awarded Desmond Fitzgerald medal, 307

Wooden shipbuilding on Puget Sound (Frank Dabney), 270-272

Woodsome, James Chadbourne, memoir (H. H. Hunt), 372

Woonsocket, R. I.: business conditions, 145, 228, 306, 386, 472; office news, 72, 239, 315

YACHT race, Miami—Key West, 312

AUTHOR INDEX

* = illustrated; (r.) = review

BLOOD, WILLIAM H.: Some problems in the operation of public utilities, 29-38

Bolster, R. H.: Forestry in the United States, *440-449

Bradlee, Henry G.: The war's effect on public utilities, 417-423

Brown, Francis: Demurrage, 42-45

CLAFLIN, G. E.: The public utility holding company, 424-439

Cunningham, William J.: What shall we do with our railroads? 9-21

DABNEY, FRANK: Wooden shipbuilding on Puget Sound, *270-272

Doolittle, F. W.: Studies in the cost of urban transportation service (r.), 54

GOODENOUGH, WALTER: The economics of a power station, *335-350

HALLOWELL, JOHN W.: The Belgian children, 255-264

Henry, T. N.: Safety work in Tacoma schools, 291-294

Hollis, Ira N.: Efficiency and democracy, 280-290

Hull, Henry: Utilizing the waste from coal mines, 363-367

Hunter, C. W.: Centralization of gas production, 175-179

Hutchins, George K.: Development of natural resources and its influence on manufacture, 46-49

JAMES, WILLIAM: The moral equivalent of war (r.), 284-290

KERR, KENNETH C.: Seattle's new era of ship construction, *265-269

LEE, GEORGE WINTHROP: Hobbies, 209-213

McCORMICK, I. W.: South American impressions, *190-198

NASH, LUTHER R.: Principles of public utility financing, 351-362
The truth about the Cleveland municipal electric plant, 103-125

PACKARD, ANSEL A.: Civilization's debt to the engineer, 214

ROBB, RUSSELL: The cost of urban transportation, 54-56

STONE, CHARLES AUGUSTUS: Technology's part in preparedness, 39-41

TRIPP, GUY E.: New uses for electricity, 50-53

WEBSTER, EDWIN S.: Impressions of the Puget Sound country, 188

Whiting, Frederic J.: The real meaning of the Red Cross, 22-23

Wilcox, Norman T.: Relation of the electric steel furnace to central station supply, 273-279

Wood, Dana M.: Comparison of New England run-off data, 126

Wood, F. J.: The evolution of the railroad, *199-208; The toll road—our first public utility, *93-102

ILLUSTRATION INDEX

AMBULANCE experiences in France, 180-186

BAHIA, BRAZIL, scenes, after 38

Bamboo grove, Rio de Janeiro, after 38

Brazilian scenes, after 38, 190-196

LIBRARY NOTES INDEX

xiii

CARS, early types of railroads, 199-201

Cattle in Brazil, 196

Coal larry in power station of New Bedford Gas & Edison Light Co., 348

Concordia, Argentina, railway station, after 38

DESMOND FITZGERALD medal, 307

FLAG RAISING outside office of Boston Elevated Railway Co., 101 Milk Street, Boston, Mass., 249

Forests: scenes in the national forests, United States, 409, 440-449;
scene in Parana, Brazil, 169

NEW BEDFORD GAS & EDISON LIGHT CO. power station, 329, 335-350

PARANA, BRAZIL, forest scene, 169

Pipe, cement, manufactured in Uruguay, 39

Power station of New Bedford Gas & Edison Light Co., 329, 335-350

Print shop, earliest picture of a, 450; modern print shop with electrical
devices, 452-459

RAILROAD, The evolution of the, 199-209

Railroad station: Concordia, Argentina, after 38; Boston & Providence

Railroad, Park Square, Boston, 202

Rio de Janeiro, Brazil, bamboo grove, after 38

Rio Grande do Sul, scenes in, 192, 196

SEATTLE, WASH.: shipyards, 265-272

Shipbuilding, stages in wooden, 270-272

TOLL-ROADS in New England, 85, 93-102

Transformers used by New Bedford Gas & Edison Light Co., 338

Tucuman, Uruguay, scenes in, 190-196

URUGUAYAN SCENES, 38, 190-196

WADSWORTH, ELIOT, 1

Webster, Edwin S., 188

LIBRARY NOTES INDEX

Book Accessions: 82, 166, 246, 325, 406, 486

Book Notices: 77, 163, 245, 321, 404, 485

Bibliographies: "List of publications of the United States Bureau of Foreign and Domestic Commerce," 78; Children's Bureau "List of references on child labor," 79; Municipal Journal "The municipal index," 80; Library of Congress lists of recent publications, 81; *New York Times* index, 485

Building: Illinois Society of Architects "Handbook of architects and builders," 322; Harding and Willard "Mechanical equipment of buildings," 321

Business: American Society of Civil Engineers "The honor system of contracting," 77; Joseph Husband "What a new system of management did for us," 77; Department of Agriculture "Survey of typical co-operative stores of the United States," 79; National Shawmut Bank "The port of Boston," 80; Federal Trade Commission "Co-operation in Latin-American Trade," 322; American Academy of Political and Social Science "The present labor situation," 323; H. V. Bozell "Data on municipal plant operation in Oklahoma," 324; Library Journal "Business number," 404; Public Affairs Information Service, 404

Economics: Bureau of the Census "Abstract of special bulletins Wealth, Debt and Taxation, 1913," 77; S. M. Harrison "Community action through surveys," 405; U. S. Bureau of Labor "Partial list of employers who are reported to have established some form of welfare work," 405

Electrical Engineering: P. S. Smith "Electrical goods in Cuba," 485; *Electrical Review* "Standard lighting schedules," 165

Finance: "Annual report of the Director of the Mint," 77; C. J. Bullock, "The taxation of property and income in Massachusetts," 164

Gas: "Artificial gas and by-products in 1915" (mineral resources of the United States), 485

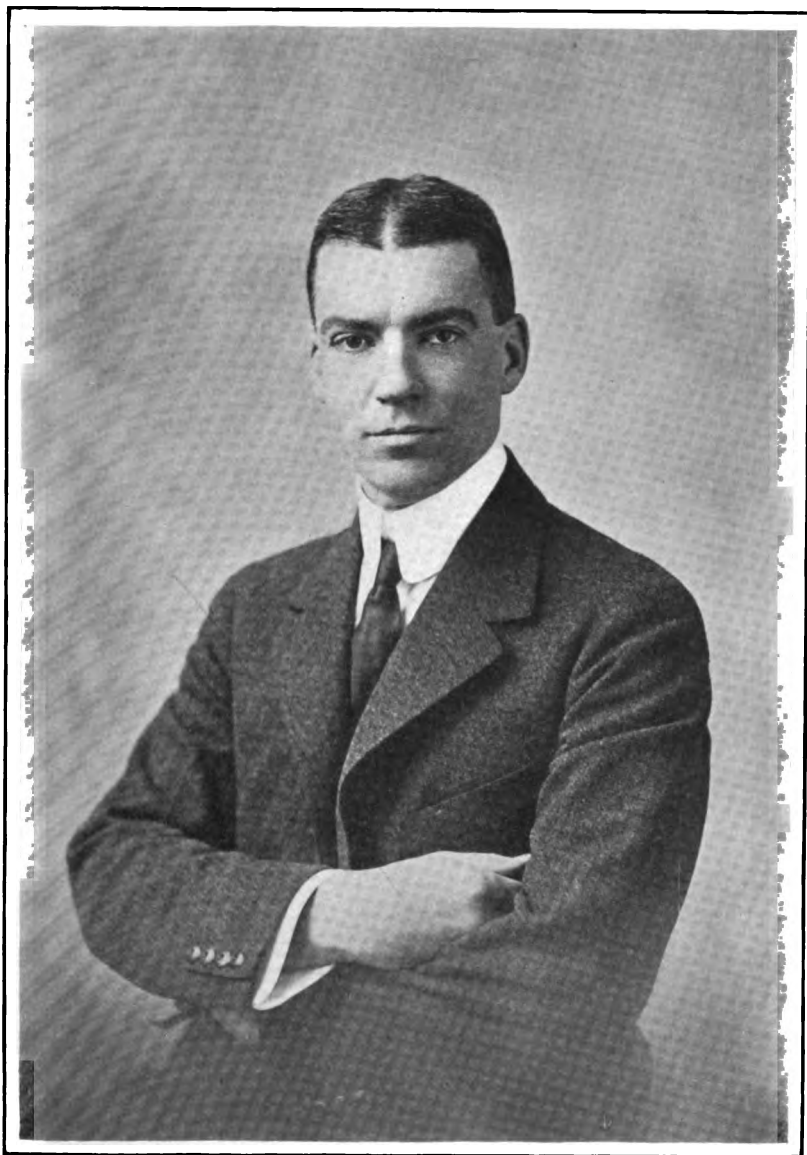
Hydraulic Engineering: Department of Agriculture "Flow of water in wood stave pipe" (Bulletin 376), 321; A. G. Flinn, R. S. Weston and C. L. Bogert "Water works handbook," 322

Law: J. E. Davies "Trust laws and unfair competition," 77; Judson King "The present status of the state-wide initiative and referendum statutes" (Senate Document 736), 425

Mechanical Engineering: A. E. Kennelly and O. R. Schurig "Tractive resistance to a motor delivery wagon," 78; Edward Godfrey "Steel designing," 79; R. R. Lawrence "Principles of alternating current machinery," 323; "Mechanical World pocket diary and year book," 485

Miscellaneous: C. C. Gilbert "Sources of nitrogen compounds in the United States," 77; American Academy of Political and Social Science "Preparedness and America's international program," 77; Railway Improvement Co. "Increasing car operation economics," 77; Annual report of the Department of City Transit, Philadelphia, 78; Bureau of the Census "Estimates of population of the United States," 165; C. P. Steinmetz "America and the new epoch," 245; handbooks of military science, 245; R. J. Bodmer "The world's greatest battle," 321; "The purposes and ideals of Mexican revolution," 323; Geological Survey "Geographic tables and formulas" (Bulletin 650), 324; H. B. Bonner "Teaching of thrift," 404; "National hymns," 485

Reference: Putnam's Word Book, 77; March's Thesaurus, 77; Soule's Synonyms, 77; Thomas's Register of American Manufacturers and First Hands of all kinds, 81



ELIOT WADSWORTH
Vice-Chairman, American Red Cross

STONE & WEBSTER JOURNAL

JANUARY, 1917

EDITORIAL COMMENT

"December 30, 1916.

MR. ELIOT WADSWORTH, having assumed the direction of the American Red Cross as Acting Chairman of the Central Committee in Washington, retires as of this date from the firm of Stone & Webster."

This notice, appearing in the Boston newspapers of January 2, was read by members of the Stone & Webster organization, and by Mr. Wadsworth's innumerable friends, with mixed emotions. It was a sequel to the press notices of a few weeks before announcing Mr. Wadsworth's selection as the new executive head of the American Red Cross. A sense of great loss is mixed with a feeling of pride and gratification that this close friend should have been chosen, strictly on his merits, for this office of national importance, and should have accepted. He serves without compensation. Mr. Wadsworth retires from business to assume the direction and to carry forward the ever-increasing activities of America's greatest organization for the relief of human suffering. His new work and ambitions take him away not only from his business associates of eighteen years but also from a community which had grown to rely upon effective service from him along many lines. His work will be centered in Washington for an indefinite period.

Eliot Wadsworth graduated from Harvard with the degree of A. B., in June, 1898, and in August of the same year entered the employ of Stone & Webster at the old offices, 4 Post Office Square, Boston. First at Tampa, and later at El Paso and Dallas, he represented the firm in various capacities. In 1901 he organized the Corporation Department and in 1902 the Securities Department. On July 1, 1909, he was admitted to partnership. From the beginning his work was unusually varied and brought him into close touch with every branch of the Stone & Webster organization.

The "Value of Service Theory"

The California Railroad Commission recently had something interesting to say about the "Value of Service Theory." This, for example: "Petitioner's refusal to claim rates high enough to yield a return on the estimated reproduction cost new of its property or any return on so-called intangible items over and above the value of physical property is based on a frank recognition of the well-established rule in public utility regulation, that while rates must be reasonable to the utility, they must, in any event, be reasonable to the public. The cases clearly establish the principle that the rates charged by a public utility must, in no event, be higher than the service is reasonably worth to the consumer."

Note the statement that rates must, "in any event," be reasonable to the public. Taken with the context, this seems to mean that rates must be reasonable to the public even if they are unreasonable to the utility. It is added that the rates must, in no event, be higher than the service is reasonably worth to the consumer. Does anyone know what this means? The case in question is that of a water company, but practically the same dictum has been uttered in connection with other kinds of public utilities.

Rates must be reasonable to the public, even if they are unreasonable to the utility; they must be no higher than the service is reasonably worth to the consumer. But what is it worth to the consumer? No one, not even the consumer himself, could answer this question easily.

As we are considering a water company case, let us ask what water is worth to the consumer. Water is one of the things which we cannot do without. Men have lived on this planet devoid of most of the things which we now consider necessities. They have inhabited caves, have slept on the ground, have eaten only what their own hands could kill or pluck from bushes, and have dressed in skins, when they have dressed in anything. But they have never been able to get along without water. They have had to have that or die. Any one of us can easily imagine a situation in which he would give all his worldly possessions for a cup of water. Nothing, therefore, so far as mere utility is concerned, is of so much value as water except the air we breathe. Now the air we breathe costs us nothing, but obviously water has a varying cost. In some situa-

tions its value may be represented by a minus sign, while in others its value is, as we have just said, equal to one's whole wealth. Industrial development is not possible without water. There are regions at present without water which, with it, could be carried to a very high point of development. Industrial products, however, have to be marketed, and under competitive conditions. Therefore, while it may be possible to obtain the necessary water, the cost may be too high for industrial purposes. Regions where this occurs naturally want to compete with other regions, and one of their ways of doing this is to put the screws on the companies which supply them with water. They cannot afford to pay much more for water than the regions with which they are competing. What the fluid is worth to them is measured by what it is worth to their competitors. It is absurd, however, to say that a water company should be governed fundamentally by this consideration. Under economic law, it must be governed by its cost of production, plus a fair profit. The consumers say they cannot meet this price and appeal to the Public Service Commission.

The California Commission quotes an old decision of the United States Supreme Court to this effect: "The public cannot properly be subjected to unreasonable rates in order simply that stockholders may earn dividends." It quotes the following also from the same decision: "If a corporation cannot maintain such a highway and earn dividends for stockholders, it is a misfortune for it and them which the Constitution does not require to be remedied by imposing unjust burdens upon the public." The decisions of the courts have made this very good law, but it is very absurd economics, and it will, if pressed far enough, be very bad morals.

A public utility implies three things: a field of occupation, a supply of capital, and an incentive to the capital to occupy the field. There can be no public utility without all three. The presence of two of the factors will not do; if the three are not there, it is equivalent to none being there. A mere field for occupation avails nothing, and an abundance of capital means nothing unless the capital may earn dividends, despite the fact that the United States Supreme Court has said that the public cannot be properly subjected to unreasonable rates in order that stockholders may earn dividends. What the court says may be very good theory, but is an impossible condition. If stockholders may not earn dividends, there will be no more public utilities

(that is, none provided by private capital), and the public will not obtain service either at reasonable or unreasonable rates. It is inconceivable that any mind could question this fact.

When public utilities were first created in this country, and almost up to the present day, the impression prevailed that they could charge rates that would be equal to the cost of doing the business, plus a fair return on the capital invested; that is, that the stockholders might earn dividends. That has always been a sound economic doctrine,—in fact, it is the governing principle of all business. Billions of capital have been invested in this country on that supposition. They would not have been invested if the owners of the capital had had the slightest prevision that the time would come when the courts would rule that stockholders' interests were not on a par with those of the users of their service.

But the courts did not say in advance that the people who put their money into public utilities could reasonably expect only such pickings as the consumers of the service might consent to leave them. Hence, stockholders today have a grievance. The public for whom they created utilities did not designedly obtain their money under false representations, but, after having obtained it, it has, through some of its courts and public service commissions, acted in a way to create the presumption of bad faith. This is an argument which need not be pressed very far at this time. Up to the present moment, much in the attitude of the public toward public utilities may be characterized as zeal without knowledge. There is, however, a growing fear that unless a halt is speedily called the attitude of the public may bear an unquestionable resemblance to that of an individual who is consciously striving to avoid his obligations. There have been some melancholy pages in American history. One of them records a wave of debt repudiation by American states. Let us hope that there never will be one recording the invalidation of honestly invested capital for the creation and development of public utilities.

We have previously quoted the United States Supreme Court as saying that, "the public cannot properly be subjected to unreasonable rates in order simply that stockholders may earn dividends." No one can say whether a rate is reasonable or unreasonable until one notes the character of the service. If all the services utilized by mankind could be graded in the order of their importance, some light might be thrown upon

this question. A loaf of bread is generally considered among the most important of all services, but what is the order of importance of a woman's trip to town to attend a bargain sale? Even if it were reasonable for the State rigidly to regulate the price of a loaf of bread, to the extent even of allowing the producer scarcely any profit, would the same reasonableness exist in connection with the woman's shopping trip?

But, after all, this is a futile question. The State can never regulate the price of bread to the extent of eliminating the producer's profit. Necessary as bread is, no one will make it without profit. If the State were to eliminate the profit, the only way people could have bread would be for them to make it themselves or for the State to make it for them. People have given up making bread to a very great extent because it is more convenient and probably cheaper to take it from the baker. It is doubtful if the situation would be improved at all if the State were to take the matter in hand. It costs a certain sum to make bread, whoever the maker may be. If the State makes it, the question will still arise, What is the product worth to the consumer? If the consumer thinks that it is not worth what it costs the State, the State and the consumer will be at daggers drawn, or the State may concede the point and charge up a loss to the taxpayers. In the last event an interesting question would arise, How many losses of this description would the taxpayers stand? Obviously, there is a point at which even State benevolence must break down.

"Exclusive Federal Control"

The Shreveport decision was handed down by the United States Supreme Court in 1914. It gave the Interstate Commerce Commission power over intrastate rates where these conflict with interstate rates. A brief review of the case will be of interest at this time because early in December, 1916, the attorney general of Texas, on behalf of the Texas Railroad Commission, and representatives of Texas shippers, appeared before the Interstate Commerce Commission and urged that the case be reopened. The original case before the Interstate Commerce Commission arose from the complaint of the Railroad Commission of Louisiana, that the railways involved maintained unreasonable rates from Shreveport, La., to points in Texas, and that they discriminated in favor of traffic within the State of

Texas, against traffic from Louisiana into Texas, by maintaining rates out of Dallas and other points into Eastern Texas, much lower than those into Texas from Shreveport. The commission found the class rates out of Shreveport to certain Texas points unreasonable, and established maximum class rates for this traffic, which were later put in force by the carriers. It also held that as to the commodity rates, a discrimination was created against Shreveport and the carriers were ordered to desist from charging higher rates for the transportation of any commodity from Shreveport to Dallas and Houston and intermediate points than were contemporaneously charged for the carriage of such commodity from Dallas and Houston towards Shreveport for equal distances. Under this ruling, the roads were free to avoid the discrimination, either by reducing the interstate rates from Shreveport or by raising the level of the competing intrastate rates. Under the previous interpretations of the law, the latter alternative seemed impossible.

The carriers appealed to the Commerce Court on the ground that the correction of the discrimination was beyond the commission's power and that, so far as the interstate rates were sustained as reasonable, the commission was without authority to equalize them with the lower intrastate rates. The decision of the Commerce Court was that the order relieved the appellants from further obligations to observe the intrastate rates, and that they were at liberty to comply with the commission's requirements by increasing those rates sufficiently to remove the forbidden discrimination. This was wholly affirmed by the Supreme Court of the United States in 1914, which said: "The fact that carriers are instruments of intrastate commerce as well as of interstate commerce, does not derogate from the complete and paramount authority of Congress over the latter, or preclude the Federal power from being exhorted to prevent the intrastate operations of such carriers from being made a means of injury to that which has been confided to federal care. . . . That is not to say that Congress possesses the authority to regulate the internal commerce of the State, as such, but it does possess the power to foster and protect interstate commerce and to take all measures necessary or appropriate to that end, although intrastate transactions of interstate carriers may thereby be controlled."

In the recent proceedings before the Interstate Commerce Commission, the reopening of the Shreveport case was urged

on the ground that the Texas Commission had not heretofore been a party to the case, and that Texas shippers should be afforded an opportunity to show that the railroads, in removing the discrimination against Shreveport, have so increased the Texas rates as to injure the commerce of that State. In explaining why the Texas Commission had not taken any part in the proceedings heretofore, the assistant attorney general of Texas said that the commission had never realized that under authority from the Interstate Commission, the railroads could violate the provisions of their Texas charters. The Louisiana Commission, the original complainant in the case, was not represented in the proceedings of December 6 and 7, 1916, but it sent a message to the commission, stating that it was not opposed to a reopening of the case nor to allowing other parties to take part. A representative of the Shreveport Chamber of Commerce opposed the reopening of the case and pointed out the benefits which had already accrued to Shreveport by the removal of the discrimination created by the lower Texas rates, which, he said, had attracted new manufactures to his city and had brought new customers to the Shreveport concerns that had formerly been shut out of the State. Attorneys for the Gulf, Colorado and Santa Fe Railroad and the Sunset-Central Lines opposed the reopening, one of them stating that if there were to be further litigation as threatened by the Texas authorities, on the ground that the railroads had violated their charters, it might as well begin now without waiting for a new decision by the commission. The general freight agent of the Sunset-Central Lines answered the contention that Texas rates had been advanced beyond the level of rates in the surrounding States, by saying that it is the purpose of the roads to advance interstate rates from Kansas, Oklahoma and other territory affected by the adjustment, in order to remove the depression in them caused by the influence of the former Texas scale of rates. In reply to questions by Commissioner Clements, he said that the only remedy for such situations was exclusive federal control of rates.

This last statement voices a sentiment that is growing throughout the United States. Yet in this particular case there has been exclusive federal control of rates for a period of two years, with the result that Shreveport is happy and Dallas and Houston are miserable, and with the prospect that Kansas, Oklahoma and other territory will before long be miserable

also. May we not expect that as soon as "Kansas, Oklahoma, and other territory" are subjected to an increase of rates to conform to the increase imposed on Dallas and Houston, even more remote regions will in turn begin to feel themselves endangered? One is bound to wonder what the end will be. Will it be necessary to have the Interstate Commerce Commission in session until the end of time settling local disputes that will always leave somebody unhappy, or shall we come eventually to a flat mileage rate that will leave everybody unhappy? A flat mileage rate would immensely simplify the situation for the railroads, but it would be likely to have a transforming effect upon innumerable communities, which would find themselves the real sufferers from rate regulation carried to its logical conclusion. The industries in the different communities have gathered capital to be employed in accordance with certain transportation facilities and transportation rates, which are likely, if the present pace is maintained, to be transformed out of all resemblance to the original conditions under which the local industries were created. In other words, there is a chance that, in the aggregate, a vast amount of capital employed in private industry throughout the United States may be materially impaired. Such a change in conditions might produce a situation which a century hence would be more desirable than the one now existing; but none of us are going to live a century, and certainly merchants and manufacturers are not going to rejoice very much over the good which future generations will get from their own hardships of the present moment.

Still, when all complexities and difficulties of rate-making are fully considered, the fact remains that exclusive federal control is the only means by which any headway can be made. The national welfare demands that rates be made from the broadest survey possible. The railway situation of the United States is merely the sum of all its parts, and no one part should be subject to modification without due reference to its effect upon the whole. Repugnant as exclusive federal control may be to those who hold to the doctrine of state sovereignty, it is getting to be more and more clearly perceived that as all railroad rates are either interstate rates or are so closely integrated with interstate rates as to bring them practically within the same category, local rate-making is bound, in the end to break down of its own weight.

WHAT SHALL WE DO WITH OUR RAILROADS?*

BY WILLIAM J. CUNNINGHAM

What shall we do with our railroads?

The question suggests that something is wrong with our railroads. It implies that new conditions have arisen—that a change of some kind is desirable. Ordinarily we do not change the established order of things unless that order is unsatisfactory in important particulars. This line of reasoning must hold true in such an important instrumentality as are railroads in our social and commercial organization. It is trite to say that railroads are the arteries through which flows the life-blood of commerce.

The large questions of railroad ownership, railroad management, and railroad service have been burning political and economic issues since the Civil War. The criticism of, and dissatisfaction with the railroads in the central west was crystallized first in the so-called Granger Laws of the 70's. Then came the passage of the original Interstate Commerce Act of 1887. This was followed by strengthening amendments. The Elkins law of 1903 was aimed at rebating. The Hepburn bill of 1906 gave the Interstate Commerce Commission complete control over rates and over every feature of railroad accounting. The 1910 amendment gave further powers to that commission, and in the meantime the individual states have very much enlarged their machinery for railroad regulation.

If there were harmony or co-ordination in the regulatory action of the forty-eight states and the Federal Commission, the situation today would not be so onerous. But as a matter of fact, instead of harmony and co-ordination there is considerable conflict and confusion. The duplication and division of authority and responsibility, as a perfectly natural result, have been harmful to the mutual interests of the public and common carriers. It was this situation of confusion and uncertainty that led President Wilson, in his message to Congress, presented December 7, 1915, to say:

“The transportation problem is an exceedingly serious and pressing one in this country. There has from time to time of late

*Address delivered before the Civic Forum of Harvard Church, Brookline, Mass., November 12, 1916, by William J. Cunningham, J. J. Hill professor of transportation, Harvard University.

been reason to fear that our railroads would not much longer be able to cope with it successfully, as at present equipped and co-ordinated. I suggest that it would be wise to provide for a commission of inquiry to ascertain by a thorough canvass of the whole question whether our laws as at present framed and administered are as serviceable as they might be in the solution of the problem. It is obviously a problem that lies at the very foundation of our efficiency as a people. Such an inquiry ought to draw out every circumstance and opinion worth considering, and we need to know all sides of the matter if we mean to do anything in the field of Federal legislation . . . Is there anything else we can do that would supply us with effective means, in the very process of regulation, for bettering the conditions under which the railroads are operated and for making them more useful servants of the country as a whole?"

As a result of the president's suggestion, the Newlands Committee has been organized, acting jointly for the Senate and the House. There will soon be a series of hearings, and later there will be a report on the whole subject of government control and regulation of interstate and foreign commerce, including the broad question of government ownership of all public utilities.

It is apparent to all of us, and particularly to the people of New England, that the president was justified in expressing fear that our railroads may not be able much longer to cope with the transportation problems as the railroads are at present equipped and co-ordinated. Indeed, we are painfully aware of the shortcomings of the railroads in this section of the country and we know in a general way that in a greater or smaller degree the same troubles obtain elsewhere.

In examining the situation as it exists today we may look at it from four different viewpoints:

- (1) That of the public
- (2) That of the investor
- (3) That of the railroad employee
- (4) That of the railroad manager

The traveling and shipping public is vitally interested first in the quality of the transportation produced, and, second, in the rates charged for the transportation service. Indeed, the quality and cost of transportation are so intimately connected with every business and social activity as to be vital to the whole public and not only to those who travel or ship freight.

As having a bearing on the cost of transportation the public is rightfully interested, too, in the honesty and efficiency of railroad administration.

The investor is interested in the security of his investment and in the rate of return. The railroads are dependent upon him for funds for extensions, enlargements, and improved facilities.

The railroad employee is interested primarily in his earning power. Like any other workman he feels that he should not be called upon to assume the risks of the business and take less for his services in times of depression; but at the same time, and it is a perfectly natural attitude, he feels that he should have a share in their prosperity when there is prosperity.

The interest of the railroad manager is three-fold. He is anxious to discharge with satisfaction his responsibility to the public in furnishing safe and expeditious transportation at reasonable rates; he is anxious to earn enough in net income to satisfy those who have invested their money in the property and to maintain the credit of his company; and he is anxious to maintain harmonious relations with the great body of employees whose co-operation is so essential.

At the present time the situation is satisfactory to none of the four interests. The public has a right to complain about the quality of the service. The investor is dissatisfied with the rate of return and with the depreciation in the value of his securities. The employees as a class feel that they are not enjoying their full share of the sudden and unprecedented earnings, which are abnormal and are due in a large measure to war conditions abroad, and 80 per cent of them are jealous, if not bitter, because the other 20 per cent, through their solidarity and political strength, have succeeded in sand-bagging the president and Congress into giving them a 20 per cent wage increase in the guise of an hours of service law. And even the four brotherhoods, who forced through the law while they held a stop watch on Congress, are at this moment very uncertain as to what the law means, and fearful that it will not give them what they expected to get.

But it is the railroad manager who is the unhappiest of the four. He is under pressure from the other three interests. He must pay heed to the protests concerning poor service. He knows that his plant is not equipped to handle the volume of business which now offers itself. He is conscious of the shortcomings of service. He knows, too, that the service cannot be

improved without additional or improved facilities. To provide these facilities he needs more capital. To obtain capital he must have credit and it is to the investor that he must look for funds. But the investor, looking at the small and uncertain returns from his railroad securities, and knowing that the rate of return and the apparent security in other channels of investment are more attractive, hesitates to put more money into railroads. The investor is a free lance. He cannot be coaxed into trusting his money in an enterprise which he regards as uncertain. It is beyond the pale of legislation to compel a man to invest his money in railroads or in anything else. And so long as the tendency of the scale of transportation rates is downward, so long as forty-eight states and the Federal government continue to enact laws which add to railroad expenses without any compensation in increased revenues, so long as wage increases are sanctioned by the public through sympathy or through arbitrations whereunder the neutral arbitrator who represents the public has the deciding voice,—so long as these conditions continue to exist, the margin of safety between net income and fixed charges will be such as to discourage, if not to prevent, the flow of the new capital so necessary for better facilities imperatively needed.

The United States, at least until very recently, has had a justifiable pride in pointing to the efficiency and adequacy of its transportation system. Our railroads are universally praised by foreign experts. The railroads of the United States and Canada exceed in mileage that of the combined railroads of Europe and Asia. The railroad mileage of the United States is about 40 per cent of the entire railroad mileage of the globe. In this country there are 381 persons per mile of railroad. In Great Britain there are 1943 persons per mile of railroad. In Germany the figure is 1698; in France, 1241; and in Europe as a whole, 2042. These figures indicate that American railroads, under private ownership, have more than kept pace with the growth of population of the country, and that our people are better served with transportation facilities than any other large country in the world.

The late James J. Hill once said that the railroads of this country, with the lowest capitalization in the world, and paying the highest wages in the world, charge the lowest rates in the world.

The latest official figures of the Interstate Commerce Com-

mission indicate that the net capitalization of the average mile of American railroad is \$66,661. That figure is less than one-quarter the average capitalization per mile of British railroad; it is only 45 per cent of the average French capitalization; and it is but 55 per cent of the average capitalization of the railroads of the German Empire. These statistics certainly support Mr. Hill's statement concerning our relatively low capitalization.

What he said about wages is true also. Our average yearly wage per railroad employee is three times as great as the average for Great Britain and France and it is more than twice as great as the average paid to the employee of the German railway administration. It should be remembered, however, that the purchasing power of the dollar under normal conditions in Europe, is greater than in the United States.

As to the rates charged for transportation, it is difficult to make exact comparisons because of differences in the character of the traffic and in the service. In passenger service our *average* rate per passenger mile is much greater than that of Germany and Belgium, but there is little comparison between our service and the third- and fourth-class coaches and the slow trains of Continental Europe. Their third- and fourth-class rates are very low, and, as more than 90 per cent of the passengers in Prussia travel in coaches of those classes, their *average* rate is less than one-half the average of this country. If a comparison is to be made with German passenger rates we should limit it to the first-class service of Germany and compare it with the first-class service of this country. The German first-class rate is higher than our first-class rate, including the charge for a chair in a Pullman car. Germany makes an extra charge for checked baggage, while we carry free 150 pounds per passenger. To be concrete in our comparison, if the German tariffs were applied to the Boston and New York service, the passenger with 150 pounds of checked baggage would have to pay \$7.67. Under the New Haven tariffs it now costs \$6.00, including a seat in a Pullman chair car. If, however, the Prussian third-class rates applied, the journey to New York, without checked baggage, would cost \$2.84 on an express train or \$2.68 on an accommodation or slow train.

The British first-class passenger rate is higher than our first-class rate, but their third-class rate (they have discontinued the second-class rates) is lower. The third-class service, however, should not be compared with our first-class service.

It is in freight service that American railroads lead the world in low rates. Our average receipts from moving one ton of freight 100 miles in 1914, was 73.3 cents, or 0.733 cents per ton-mile. That rate is just about one-half the average for Germany and just about one-quarter the average for Great Britain. It should be stated, however, that the comparison with Great Britain is not fair to that country inasmuch as their average includes the charge for the collection and delivery of freight moving under the higher class-rates.

Inasmuch as there is a tendency in the discussion of government ownership to point to Prussia, where, under the strongly centralized and autocratic government, state ownership is a financial success, it is proper at this point to direct your attention to the fact that our railroads, with one-half the average capitalization per mile, and paying employees about double the average wage, charge only one-half the Prussian rate per ton-mile.

How is it done? Simply because we have excelled in our train efficiency, particularly in freight service. Because of our heavier locomotives, our larger cars, our heavier structures, and our superior operating methods, our average train load has steadily increased so that it is now just about double the average freight train load in Prussia.

One of the outstanding features of American railroad administration is the evidence of the ability of railroad managers, at least up to the present time, to meet the increasing demands upon them for higher wages, for better service, for more expensive facilities and equipment, for safety appliances, for grade crossing protection, and for other regulating laws, including large increases in taxation. It is truly remarkable to observe how one added expense after another has been met by increased efficiency. While these increases in expenses and charges have been adding their burdens to management, the rates have tended to remain stationary in passenger service and have tended to fall lower in freight service.

A retrospect of ten years will show some interesting comparisons. Let us look at the figures for the decade ending with June 30, 1914. In that period the population of the country increased 20 per cent. The railroad track miles increased 27 per cent, and the net capitalization increased 45 per cent. The increase in gross revenues was in excess of the increase in capitalization—54 per cent, but the operating expenses in-

creased in much greater ratio, viz., 64 per cent. The net revenue, however, because of the greater volume of business, increased 33 per cent, but at the same time taxes increased 127 per cent. With an increase of 45 per cent in capitalization the railroads increased their passenger miles 60 per cent and their ton miles 65 per cent.

A comparison of 1914 with twenty years ago reveals the fact that the growth in mileage, in traffic and in earnings was relatively much less in the second decade than in the first decade. In other words, the increases in trackage and in capitalization representing both additional trackage and other improvements brought a much smaller return in the second decade.

	Per Cent Increase	
	1904 over 1894	1914 over 1904
Capitalization	34 %	45 %
Operating Revenues	84	54
Operating Expenses	83	64
Net Operating Revenue	87	33
Taxes	62	127

The striking point in the comparison of the results in the two decades is this: In the first period, the increase in expenses was slightly less than the increase in gross revenue and the net operating revenue showed a gain of 87 per cent. In the second decade, expenses increased in greater proportion than revenues and the net revenue increase was only 33 per cent. In the meantime the interest charges on the greater investment took a larger part of the net revenue, and taxes increased 127 per cent.

To give some concrete examples of the heavy increases in expenses which are incident to changed conditions and to the demands for better equipment, such as steel passenger coaches, it may interest you to know that twenty years ago the standard passenger locomotive when purchased for New England railroads cost about \$8,400. Last year, before war conditions caused such an abnormal increase in the cost of materials, the standard locomotive purchased then cost \$25,000. The wooden passenger coach of 1895 cost about \$6,000. Last year a modern steel coach cost about \$14,000. An ordinary wooden box car in 1895 cost less than \$700; in 1915 a modern box car with steel under-frame cost \$1,250. If, however, orders were placed today for new equipment the prices, because of war conditions, would be 25 per cent to 40 per cent more than the figures just quoted.

Up to a few years ago the policy of American railroads

was to keep well ahead of the demands of growing traffic by improving and enlarging their facilities and equipment. The cost of these improvements was met either from current income or from the sale of new securities. The policy of the Pennsylvania Railroad, for instance, was to put one dollar back into the property for every dollar declared in dividends. Other railroads pursued a similar policy, although few of them were so conservative. Consequently, the railroads, as a whole, were kept in a condition to handle the growing business economically.

Since 1906, however, and particularly since the depression of 1908, it has been difficult to continue this policy. The program for improvements was very much curtailed in 1908-09-10, and when the revival of business came in 1912 and 1913, there was serious embarrassment because of inadequate facilities and shortage of freight cars. From 1913, the tide of traffic receded, and during the first year of the European war, the danger signs were plainly seen. It was found that the limit for absorbing the higher operating costs and taxes had been reached. The petitions to the Interstate Commerce Commission for relief in higher rates were unsuccessful. The efforts to increase net revenue by intensive efficiency in operation were disappointing. It became necessary not only to suspend what little improvement work was under way but to run very close to the line on maintenance. The stronger companies stood pat and conserved their resources. The weaker companies had to succumb.

So it came to pass that in 1915 over 42,000 miles of railroad passed into the hands of receivers. One-sixth of the railroad mileage of the country was bankrupt. Never before were the financial affairs of American railroads in such a precarious condition. Railroad construction and improvements practically stopped. The mileage of new railroads constructed in 1915 was less than that of any year since the Civil War. Orders for new equipment dropped to an unprecedented level and drastic retrenchment in expenses and curtailments in service were everywhere in evidence.

The situation changed somewhat within the past year by reason of the unprecedented traffic due to the war in Europe. The earnings for the fiscal year ended June 30, 1916, broke all records. But the sudden growth in business, in all probability, will not be permanent. The relief which the larger earnings have brought is but temporary. Moreover, the facilities are so over-

taxed that the traffic cannot be handled economically. The congestion has clogged the channels of traffic. The law of increasing returns, under which a greater volume of business is handled at a lower unit cost, a law which ordinarily is peculiarly applicable to railroads, has ceased to apply. Instead it is a law of decreasing returns, since every additional ton now being handled is carried at a higher unit cost. The year which will end on June 30 next will show disappointing results. Unless I am very much mistaken the final figures will show that the added cost of handling the additional traffic during the fall and winter of 1916-17 will be greater than the additional revenue therefrom. The railroads, as well as private citizens, feel the effect of the tremendous advances in the costs of materials. At this moment coal, which ordinarily makes up 11 per cent of operating expenses, and which normally in this section of the country costs about \$3.25 per ton, cannot be purchased at less than \$6.00 or \$9.00 per ton. The shortage in labor has produced a marked falling off in the efficiency of railroad workers. Unit costs in all departments are soaring.

The truth of the matter is this. The railroads have about reached the limit of their capacity through increased efficiency and through the operation of the law of increasing returns to absorb the heavy increases in expenses due to higher wage rates, to the higher costs of materials, to the demands for better service and for steel equipment, to the increases in taxation, and to the flood of regulating laws.

It is not to regulation in itself that objection can properly be made. It is rather to the duplication of regulation, the inconsistency and confusion which grows out of divided authority. If the regulation and control were centralized and co-ordinated, if it were unified and had a common purpose, no fault could be found with it. It is the lack of uniformity and co-ordination which is embarrassing and costly.

That there have been several cases of maladministration and failure to observe ordinary business ethics in the financing and management of railroads, cannot be denied. Nor can the action of responsible officers and directors of a comparatively few railroads in widely advertised cases be defended or condoned. It must be remembered, however, that it is about the black sheep that we hear the most. We hear little about the other ninety-and-nine of the flock whose fleeces are white.

Speaking as one who has had a fairly long and extensive

experience in railroad service, where for many years I was close to railroad executives and in a position to appreciate the difficulties in their problems, it is my mature opinion, and I speak now as a neutral student, that the thing that the railroads need now in their hour of trial is public confidence and support. You may say that they do not deserve confidence and support. You can cite so many reasons why the right of confidence and support has been forfeited that it is difficult to answer your arguments. But nevertheless I am sincere in stating as a personal conviction that the railroad managers of today, taking them by and large, mean to be honest in their administration, mean to discharge honorably their duties to the public, and are doing their best to give a satisfactory account of the trust which the owners of the properties (a small army of 600,000 stockholders and about the same number of bondholders) have reposed in them.

The crux of the railroad situation is this. With rate regulation over a series of years tending to force rates downward, with laws pertaining to railroad operation tending to force expenses upward, with employees (backed by public sentiment) demanding and securing higher wage rates and more expensive working conditions, and with the higher costs of all materials coupled with the demands for better equipment, the railroads are unable to make both ends meet. While no one should be so rash as to state that the ultimate limit of further efficiencies has been reached, it is a fair statement that railroad managers, in spite of conscientious efforts, are unable to stem the receding tide of net income. The signs of the times are seen in the many receiverships, in the practical cessation of railroad building, in the serious curtailment of orders for new rolling stock, and in the congestions, embargoes, and inferior transportation service. The deterioration in service is due to the failure of facilities and equipment to keep pace with the demands of growing traffic; the failure to provide better facilities and equipment is due to waning credit; and the waning credit is due to the narrowing rate of return.

It is to gather complete information on these things that the Newlands Committee was created. That committee is charged, too, with the duty of answering the question propounded tonight, "What shall we do with our railroads?" It is for them to report to Congress whether our plan of regulation is defective and, if so, how it is to be improved. It is for them to

say whether additional income should be provided by increasing rates, and, if so, in what manner and in what degree. It is for them to say whether the idea of private ownership plus government regulation should be continued, or if we shall instead embark on the perilous seas of government ownership.

Personally, I sincerely hope that we can find a solution short of government ownership. While I dislike to admit it, it is plainly apparent that we are drifting nearer and nearer to government ownership. The passage of the Adamson eight-hour *pay* bill, is a long step toward it. I agree thoroughly with Frank A. Vanderlip, a clear-visioned and respected financier, who recently said in a public address:

"It is time to take the blood pressure of the railroads. When it is taken I predict that there will be found a hardening of the arteries. We have put on the railroads such restrictions that investors are no longer giving them the wherewithal for capital to meet the demands of business. If we ever get into a struggle in such a condition we will go under. Men have said to me that we are tending toward government ownership. If so we are tending toward a national tragedy."

I have some personal knowledge of government ownership in our neighboring country, the Dominion of Canada. There is in her experience with government-owned roads nothing that we should desire to emulate. The experience of France with her government-owned roads, the experience of Belgium, of Italy, of Australia and of New Zealand, if viewed critically, is disappointing. While there may be isolated exceptions, it is a fair generalization to state that in no *democratic* or quasi-democratic country has government ownership proved to be a success. In some countries it has resulted in lower rates, but the losses in revenues through the lower rates and lower efficiency have been saddled upon the taxpayers, and the service has suffered.

The only example of successful government ownership is found in Prussia, with its highly centralized, powerful and monarchical government. There the railroads make money for the state. Their service, while good, is not as good as ours. It has its serious defects, but the German public has a habit of looking at these defects in a matter-of-fact way. They endure hardships in railroad service which here would provoke indignant protest. In short, no analogy, no parallel can be drawn between government ownership as it is in Prussia and government ownership as it might be here. Social conditions are essentially

dissimilar. There is no taint of graft in the railway administration of Prussia. Government service is regarded as highly honorable service. It is service for the King. The power and prestige of the King are behind the Minister of Public Works, who is appointed by and responsible only to the King.

In this country, where to our shame there is so much graft in public service, where the high officials under government ownership might be expected to administer the properties with a view to political advantage, where each change in administration would bring a change in personnel, and where the distribution of funds for improvements would be governed by pork-barrel methods—with these and other things which are common to any democratic form of government it is too much to hope that the administration of publicly owned railroads in this country would be anything but wasteful and inefficient, and that the service would not suffer in comparison with present conditions.

Instead of embracing the dangerous alternative of government ownership should we not patiently give our national policy of private ownership and public regulation a further trial, and make an effort to improve our methods of regulation?

Undoubtedly many well-thought-out suggestions will be made to the Newlands Committee. Among these which have had serious consideration, and which, no doubt, will receive the careful thought of the committee, are these:

The divided authorities and responsibilities (or lack of responsibilities) of the Interstate Commerce Commission and the State Commissions or other regulating bodies of the forty-eight states are subversive of the best interests of the nation as a whole and of the railways as a whole. One state, jealous of its local interests, may adopt a selfish attitude which will block comprehensive plans which would inure to the benefit of several states. The regulating laws of the several states are conflicting, both as between the states themselves and the Federal Commission. Let us have exclusive federal incorporation of railroads, federal regulation of railroad securities, and federal regulation of rates and service, both state and interstate.

It is obvious that the Interstate Commerce Commission is already overburdened. It cannot assume further duties unless it is enlarged, and unless some of its work is delegated to a subordinate or co-ordinate body. Instead of concentrating the work in one commission in Washington let us have regional

commissions, much as we have federal district courts. Allow the regional commissions to handle the great bulk of the work, permitting the Interstate Commerce Commission to concentrate its attention on large matters of national railroad policy and on reviewing the findings of the regional commissions.

There is merit in another suggestion that there should be a division in the functions of the Interstate Commerce Commission. As at present constituted it is clothed both with executive and with judicial powers. The principle of our constitution that the executive, legislative and judicial branches of the government should be separate and co-ordinate is violated. The commission now is not only the judge, but as well the detective and the prosecuting attorney. Let us make the commission the supreme regulating body, confining its broad functions to rates, routes and powers affecting railroad revenues, embracing as well the regulation of incorporation and capitalization. Relieve the Interstate Commerce Commission of the functions of supervision, detection and prosecution, and place these in the hands of another separate and co-ordinate body to be known, say, as the Federal Railroad Commission. Allow the states to control only such railroad affairs as are of purely local interest.

It is obvious that such plans as these require careful study and a clear definition of authority and responsibility, particularly with respect to the twilight zone between railroad affairs of purely local interest and those of national interest. It matters little just how it is worked out so long as the definitions of power are made unmistakeably clear. What we need is a national, co-ordinated and unified system of regulation, a system which will eliminate the existing unco-ordinated and conflicting laws and orders of today.

If these inconsistencies can be ironed out, if we can bring about a greater mutual confidence between the public, the regulating bodies, and the railroads, if the vanishing credit of railways can be restored by constructive and sympathetic regulation, if, thereby, investors can be induced to assist the railroads in providing the better facilities which are so necessary to satisfactory transportation service,—then from the viewpoint of the public we may look forward with assurance to better service, and from the viewpoint of the investor to reasonably satisfactory returns.

THE REAL MEANING OF THE RED CROSS*

BY FREDERIC J. WHITING

The *Red Cross Magazine* announced last February that the American Red Cross should have three times as many members as it then had. It cited the case of Japan with a population of 40,000,000, and 1,800,000 members; of Germany, with 67,000,000 population and 1,000,000 members, and the United States with 100,000,000 population, and only 31,000 members. Since then a determined effort has been made to overcome this situation, and today (December 1, 1916) there are 286,000 Red Cross members in the United States. Instead of having three times as many as in the opening months of the year, we have nine times. In Boston alone there are more than there were in the whole country ten months ago.

Interest in the Red Cross has been enhanced for some of us by the fact that Eliot Wadsworth of the firm of Stone & Webster has recently consented to accept the position of vice-chairman of the American Red Cross. Mr. Wadsworth was graduated from Harvard University in 1898, and in 1909 became a member of the firm of Stone & Webster. In 1915, he went abroad as a member of the Rockefeller Foundation War Relief Commission and made a careful study of European conditions. This study deepened and intensified a previously existing interest in humanitarian work. Despite this fact, however, it is a notable occurrence to find a man with such large and absorbing business activities definitely committing himself to this exacting occupation.

Facts like the above, together with others which might be mentioned, such, for example, as the propagandist work undertaken by thousands of business men, scholars, women preoccupied in domestic and social affairs, and workmen of every class, signify that the real meaning of the Red Cross is being carefully studied and better understood. It is the effort of this article to indicate some of the results of this study.

The Red Cross, like other great institutions, is evolutionary. It has come into existence to meet a felt need. In this case, the need existed hundreds, perhaps thousands, of years before the institution was created. The Red Cross is a thing of today,

*The writer desires to express his indebtedness to Miss Mabel Boardman's "Under the Red Cross Flag."

though the sufferings which it is now bent on relieving have characterized the world from time immemorial. About a half a century ago, the periodical torture from war became at last unbearable. The time had arrived for organized effort to alleviate it, and the Red Cross is the outward and visible sign of that inward and spiritual grace which prompted mankind to its mission of rescue.

Everyone who has had anything to do with war knows that, in the best of circumstances, it is hell. The nations of antiquity were not unmindful of the horrors of the battlefield. They did what they could for the wounded, but their facilities were meagre. Nor was the situation much improved during the Middle Ages. Charitable individuals were alert, and the various orders of knighthood systematically attempted something in the way of hospital accommodation. But, when everything is said, the lack of care for the wounded was deplorable. This is true even of our own Revolutionary War.

The efforts of Florence Nightingale and her assistant nurses in the Crimean War may, perhaps, be called the turn of the tide. Their performance was so notable that Florence Nightingale's name is still a household expression, an inspiration to an ever-increasing effectiveness in alleviating the woes of humanity. The name, however, which stands most clearly and distinctly related to the Red Cross is that of Henri Dunant, of an old Geneva family and of French-Swiss descent. He was thirty-one years old when, in 1859, occurred the battle of Solferino between the Austrians and the united armies of Sardinia and France. That conflict filled him with horror.

He has described the sufferings of the wounded in terms that wring the hardest heart. Here is one of his many ejaculations: "What agonies! What sufferings during the days of June twenty-fifth, twenty-sixth, and twenty-seventh! Wounds poisoned by heat, by dust and by lack of water have become intensely painful. Suffocating stench pollute the air in spite of efforts to keep in good condition these local hospitals. Every quarter of an hour, the convoys sent to Castiglione are bringing new loads of wounded. The insufficiency in the number of assistants, of hospital orderlies, of servants, is cruelly felt. In spite of the activity of the Commissary Department, which is organizing transportation to Brescia by means of ox-carts; in spite of the spontaneous care of the inhabitants of Castiglione, who transport the sick, the departures are much less

numerous than the arrivals, and the crowding grows unceasingly greater. On the stone floors of the churches of Castiglione are placed, side by side, men of every nation. French, Germans, Slavs and Arabs are temporarily crowded to the most remote parts of the chapels. Many have no longer the strength to move themselves and cannot move or stir in the narrow space where they are lying. Oaths, blasphemies, and cries which can be interpreted by no expression, are sounding beneath the arches of the sanctuaries. 'How I suffer,' say to me some of these poor fellows. 'We are abandoned, left to die miserably, and yet we fought bravely!' They can get no rest, in spite of the nights they have passed in sleeplessness and long-endured fatigue. In their distress they beg for help which is not given. Some, in despair, roll in convulsions which will end in tetanus and death. Others believing that the cold water poured on their festered wounds produce worms, which appear in great numbers, refuse to have the bandages moistened. Others still, whose wounds were dressed at the improvised hospitals on the battlefields, are given no further attention during the halt they are obliged to make in Castiglione, and as these bandages are very tight, in view of the roughness of the transportation, and have not been changed, they are suffering veritable tortures. These, whose faces are black with flies, with which the air is infested and which cling to their wounds, cast on all sides distracting glances, but no one notices. On these, the cloaks, shirts, flesh and blood form a compact mass that cannot be removed."

No more need be said to prove the need of the Red Cross. Immediately following this incident, Dunant wrote "*Un Souvenir de Solferino*," which a few years ago was translated into English with the title "*The Origin of the Red Cross*." This pamphlet has had a remarkable result. It made a profound impression throughout Europe. Victor Hugo wrote to the author "You armed humanity and served liberty." Dunant was quick to take advantage of the impression which he had created. He visited many European countries and interested many persons in the plans which he had formulated. These plans included the adoption of a common and uniform flag to mark hospital formations. There was already in existence in Geneva a Society of Public Utility devoted to philanthropic and humane work. This society as a result of Dunant's efforts sent out a general invitation for a conference to be held at Geneva in October, 1863, to consider the question of volunteer aid for the medical

service of armies in time of war and also for the neutralization of its personnel.

Fourteen European countries were represented at the conference. The deliberations may be summed up as follows: in each country adhering to the proposed agreement, a committee should be formed to co-operate in time of war with the military medical service, each committee being organized as its members deemed expedient; in time of peace a trained personnel should be organized and supplies collected; aid of the societies of neutral nations might be invited; the volunteer societies, irrespective of the country to which they belong, should wear a distinctive badge—a red cross on a white ground; hospital formations and their personnel should be neutralized. Such was the success of this conference that the Swiss Government, in 1864, addressed an invitation to twenty-five sovereign states to send representatives to a diplomatic convention to be held in August of that year at Geneva. At this gathering, there was present Mr. Charles S. P. Bowles, European agent of the Sanitary Commissions, which had done such valuable service under the leadership of Dr. Bellows during the American Civil War. The outcome of the conference was the Geneva Treaty, sometimes called the Red Cross Treaty, which provided for the protection of hospital formations and their personnel in time of war, and the Red Cross flag, which is merely the Swiss flag reversed, a red cross on a white ground. The Red Cross Treaty was revised at a convention held at Geneva in 1906, the Red Cross or volunteer aid societies which have received official sanction from their respective governments being brought under its protection. The Treaty of The Hague extends to naval warfare the provisions of the Treaty of Geneva.

Such, in brief, was the origin of the Red Cross. To this historical review should be added the pathetic note that Dunant spent everything he possessed in furtherance of this noble scheme, and when reduced to poverty disappeared from sight. For many years, nothing was heard of this "modest and good man," but at last, in 1897, he was discovered in the Swiss village of Heiden, where he was living in misery in a "home for old men," with almost no other means than a small pension from the Empress of Russia. An appeal was immediately sent out for a contribution to provide for his last years. In 1901, when the Nobel-Peace-Prize, valued at 208,000 francs, was

awarded for the first time, it was divided between Henri Dunant and Frederick Passy.

Time would fail to detail the activities of the Red Cross. The institution has taken a strong hold of the conscience of the different powers, great and small. Other peoples have come near putting Americans to shame in this matter. Until recently, the zeal of the Japanese, for example, has far exceeded ours. The Germans, too, have given us a lesson in Red Cross efficiency.

Yet the American Red Cross has had a notable career. After a more or less desultory existence, it was thoroughly reorganized in 1904 and 1905, and put upon a businesslike basis under governmental supervision, and under a Congressional charter, which constituted it the only official organization to furnish volunteer aid to the sick and wounded of armies in time of war, authorizing it to act as a medium of communication between the people of the United States and their army and navy, and, further, to continue and carry on a system of national and international relief in time of peace, and apply the same in mitigating the sufferings caused by pestilence, famine, fire, floods, and other great national calamities, and to devise and carry on measures for preventing the same. The auditing of all Red Cross accounts was placed in the hands of the War Department, and an annual report to Congress on the operations of the Red Cross was required of the chairman of the Central Committee. The President of the United States is President of the Red Cross and the Surgeon Generals of the Army and Navy are on its Executive Committee. Since this reorganization, the American Red Cross has participated in relief work in connection with no less than eighty great disasters, such as the San Francisco fire, the Messina earthquake, the Mt. Taal eruption, the Philippine typhoon, the Manchurian pneumonic plague, the Michigan forest fires, the Omaha tornado, the Titanic wreck, the Ohio and Mississippi floods, the European war, the Serbian typhus epidemic, expending, or directing the expenditure of, more than \$15,000,000.

This is an illustrious performance. Yet, it means far more than appears on the face; for after all the great achievement of the Red Cross is not the alleviation of temporary distress, but the inculcation of nobler sentiments in the heart of mankind. By precept upon precept, with here a little and there a little, it is consciously and unconsciously raising the level of humanity.

It is bringing us to a keener and keener realization that God has made of one blood all nations that dwell on the face of the earth. This is a fact of practical importance which the world has ignored for too many thousands of years. By failure to take cognizance of it, it has been retarded in all its activities, mental, moral, and industrial.

There is nothing pertaining to the life of man that does not have its utilitarian aspect. Benevolence, though most admirable as a spontaneous surging of the heart, is not to be despised as a mere utterance of practical morality. It is certainly true that righteousness exalts a nation; while it is to be desired for its own sake, it is not to be neglected as a means of advancing self-interest. On this admittedly lower plane of thought, the Red Cross is one of the greatest expedients ever adopted by this nation.

It aims to effect the quickest and best mobilization of our moral resources. The import of this surpasses the imagination. We cannot foresee with any exactitude just what it will accomplish, but we can feel certain that, if the work goes on with the acceleration recently acquired, it will be transforming. The tendency of the Red Cross work is not only to relieve present suffering, but also to create conditions which will reduce the likelihood of future suffering—in other words, to put the everyday conditions of men and women everywhere on a more secure basis, and thus to increase the efficiency of the race in practical affairs. Such an end must necessarily follow the elimination of the great economic waste that in the past has characterized human affairs in consequence of war, famine, pestilence and other disturbances of the natural order. In short, humanitarian effort, like honesty itself, is the best policy.

It is hardly supposable that the Red Cross work can go on at the pace now set for it without drawing the nations closer together. Its part in the present war points to that fact. There is universal hope that the experiences of the last two years foreshadow the decline of the military spirit; but even if wars cease for a long time, there may remain racial jealousies and animosities to be overcome. It is quite as much by its efforts in times of peace as by those in times of war that the Red Cross is gradually cementing the nations. This feature of its work will, let us hope, be prosecuted with increasing zeal and effectiveness so long as human suffering exists. It is this hope that

leads us to look for a racial *rapprochement* that shall divest the world of its blind and wasteful parochialism.

In the final analysis, however, one's enthusiasm regarding the work of the Red Cross springs from the nobler thought that the Red Cross is bound to deepen and broaden the morality of the American people, by enlarging our sympathies; by making us more susceptible to the needs of others; by making us as democratic in thought and feeling as we are in our political activities; by bringing about such a solidarity of mankind as shall make us realize, in a degree never before attained, that each of us is, in a real and substantial way, his brother's keeper.

SOME PROBLEMS IN THE OPERATION OF PUBLIC UTILITIES*

BY W. H. BLOOD, JR.

The question has been frequently raised as to the applicability of the Taylor System of Management to the operation of public utilities, or as it is sometimes put,—“Why do not public utilities make use of scientific management as outlined by Mr. Frederick W. Taylor and his followers?” I would answer this question in a most illogical manner. I would say: “This system is not applicable to the operation of public utilities, and we do make use of it.” I mean by this contradictory statement that in its ordinary form the Taylor System does not fit public utility operation; I mean also that no suggestion of Taylor or his associates has ever been made which has not at some time or other, in some way or other, been applied to the operation of public utilities, and many of them have been adopted and are in use today.

When Mr. Taylor first publicly presented his ideas, if my memory serves me aright, he applied his system to “Shop Management,” and he advocated the study of “How Long it Takes to do Work” or the “Making of Scientific Time Studies.” In later years he and his associates have called the system “Scientific Management,” and the implication has been that it is a universal panacea to bring about “greater national efficiency” and that it is “applicable to all kinds of human activities, from our simplest individual acts to the work of our great corporations, which call for the most elaborate co-operation.” It is also claimed that the presidents of our largest companies and even our household servants can have their activities regulated by scientific management.

I have no criticism to make of Mr. Taylor, nor have I any fault to find with the system bearing his name, but I do believe that scientific management, like many other good ideas, has its limitations. You certainly cannot apply the same rule to the painting of miniatures on porcelain that you would do the painting of bill-boards, although both make use of paint and the work is done by definite hand motions of an individual.

*A lecture before the first year students in course on “Factory Management,” Graduate School of Business Administration, Harvard University.

It seems to me that it would be foolish to try to lay down any set motions that a surgeon must go through in setting a broken limb, while, on the other hand, it is perfectly feasible to plan out a system for shoveling iron ore. There is also just as much difference between the production of kilowatt hours and the manufacture of shoes.

The operation of a public utility plant and the running of a shop are, I believe, fundamentally different. The public utility furnishes a service; a shop turns out a commodity. Commodities may be turned out when, how and where you like; service must be rendered entirely to suit the user. To turn out more units in your shop, you can speed up your machines, you can double your force, you can work nights, you can store your product, and you can build your plant in Cambridge or in Kalamazoo, and you can shut it down or run it when you wish. To furnish a service you must run your machines at a steady speed, extra revolutions per minute do not increase efficiency; the men on the job are not always busy from the very nature of things; you run your plant twenty-four hours per day—you cannot do more than this; you cannot store electricity, it must be on tap so that any one can get it instantly by the simple pushing of a button; and you must bring this service to the very door of your customer or else you would not be furnishing real service.

The desideratum of a public service company is not "How quickly can the work be done?", but rather "How best can it be done?" A trolley company does not want a motorman who can speed up his car; it requires one who will stick to the schedule, be it fast or slow. It must have a man who is careful, who is observant, who thinks for himself. In a conductor the quality of politeness counts for much more than that of speed. We find "maximum output" the text upon which all the sermons of the Taylor books are preached. True it is that the workmen, under scientific management, in a degree get the benefit of the increased output. Piece work, the premium plan, the bonus plan, all tend to increase wages. I fully recognize that the system of pay is but one of the subordinate elements in scientific management, so-called, but the increase in pay is the only thing about scientific management which appeals to the laborer, while increased output is the motive of the manufacturer.

Mr. Taylor speaks of two kinds of management. The best type in ordinary use he calls "Initiative and Incentive Man-

agement" in contradistinction to "Scientific or Task Management." Is it strange that a self-respecting workman hates to give up working for a concern which recognizes his initiative and rewards him for suggesting new ways and methods of bettering the product or of increasing the output? Is it strange that an intelligent American balks at the term "task management"?

Mr. Taylor says "perhaps the most prominent single element in modern scientific management is the task idea." This statement is probably true as applied to shop work, to low grade labor, to the manufacture of the same article day after day; but even when applied to such operations, how can it help but turn men into machines? It is no wonder that intelligent labor fights it. It tends to make wooden men out of flesh and blood. It cannot but destroy initiative, and we need initiative. Initiative means growth. Suppose you pick out a hundred men for some particular work. You may select ninety-nine who are satisfied, because of a little extra pay, to become automatons, but certainly there will be one man at least who will rebel, who will have ideas of his own, who can show the management something, who can cut the corners, who, if he has the opportunity, will become the brains of the organization, who will replace the superintendent or the manager at some later day. Is it fair? Is it wise? deliberately to kill such a man or break his spirit by something which you call "scientific"? Can a stop watch in the hands of a young college man, or a series of motion photographs, supply the same kind of information that one who has worked up from stock clerk to superintendent can furnish? You will probably answer me by saying: "Look at the results; here is a man who used to shovel twelve and one-half tons of ore per day who now, under scientific management, handles forty-seven tons; here are brick layers who under old methods laid one hundred twenty bricks per hour and who, under scientific management, lay three hundred and fifty per hour; look at this shoe shop which, under scientific management, increased its output one hundred per cent." True enough, we admit all these statements; we are ready to acknowledge that some excellent, even astonishing, results have been accomplished along certain lines, but does it follow that similar results can be brought about in every line of endeavor?

Does it follow that because we can get shoe operatives to double their output it is wise to ask the dentist to cut the time in half when filling a tooth? Because a brick layer places three bricks in the time it previously took him to place one, would

you insist that a surgeon should perform three operations for appendicitis each morning instead of one? Is there not a difference between professional work and shop work?

There must be some limitations to the system of scientific management. The essence of all of Mr. Taylor's studies, and the point most emphasized in all his writings, as far as I have been able to ascertain, is *time*. Time to my mind is but one element, and I believe we can show that in the operation of a public utility time is of far less importance than many other items.

Let us see therefore how far we can apply scientific management to the operation of a public utility. I think that when you finish the analysis you will see that a modern public utility furnishing electric light, power and transportation, is not lacking in scientific management. I wish particularly to call your attention to the fact that in the operation of a public utility it is just as important for the men who do the work to have brains as it is that the management should possess them. A man without initiative, a man who cannot think for himself, is not wanted in a public utility.

In the short time at my command I cannot even outline to you all of the points to be considered in the operation of a utility and am forced to limit myself to one phase of its activity. In a public utility there are three important branches or departments. First the operating department, or, as you would call it, the production department; second the distributing department, and third the selling organization. As I understand it you are particularly interested in the production department, and I shall therefore confine my remarks to that phase of public utility operation and will outline to you the steps which the organization with which I am connected have taken in applying what we term "betterment work," which is more or less synonymous with "scientific management."

* * * * *

Upon entering this plant there were found methods of operation and maintenance lower than that of the average for the same size plant throughout the country. As it became possible to look further into its condition it was found that a state of affairs dangerous to the physical existence of the plant was in force. Discipline among the station forces was at a low ebb and in spite of the general simplicity of the plant, dirt and disorder were prevalent. As the betterment work was put under way the chief engineer frequently expressed his disbelief of its value and successful outcome, although every effort was used

to bring him into touch and sympathy with the work. It was found that the following, in order of merit, had the greatest effect in improving the steam economy of the plant:

1. Changing methods of firing furnaces.
2. Installation of maintenance schedule.
3. Changing schedule of boiler operation.
4. Changing schedule of unit operation.
5. Improving vacuum.
6. Thorough cleaning of boilers.
7. Raising and maintaining feed water temperatures.
8. Raising and maintaining steam pressure.

Now these are all matters of detail, but as you know, the only way to improve efficiency through scientific management is by studying details and correcting acts which are improperly done.

The production of five satisfactory firemen from labor of the class available (this was a southern plant and the laborers were all negroes) required repeated weeding out of the untrainable and correspondingly frequent hiring of new material, so that it took about two months before this number of men could be gotten together, every one of whom was thought capable of reasonable efficiency. In order that we might have at all times a supply of material from which to select firemen as needed, coal passers were chosen, with a view to their capabilities in this direction (apparent intelligence and physique being the criteria without regard to previous experience), and these were given preliminary training through assisting the regular firemen at times of cleaning fires.

An adequate number of furnace tools of the standard design adopted by our organization were furnished and the men were instructed in their use. In a previous case we had found that the firemen did not spread the coal evenly because they always took a large shovel full. This fault was corrected by cutting off about four inches from the end of the shovel. It required more shovelfuls but made it easier to spread the coal evenly. Damper operating mechanisms which were inoperative were put in working order and the firemen individually told how much coal to use and when to apply it and the proper control of the draft. They had no set motions to go through but they were shown how to get results.

In order that the watch engineers might become thoroughly familiar with every detail of the proper handling of fires, that they might continue intelligently the training and supervision

begun, they were all required to spend a considerable portion of their time in the fire room receiving instruction simultaneously with the men. Our instructions were as follows:

"The coal, all lumps of which are reduced to about chestnut size, is to be spread lightly and evenly over the fire, thus insuring uniform mingling of the air passing upward through the hot bed of partly burned coke and ash with the combustible gases as they are distilled from the freshly fired fuel. On account of a slight difference in draft, the covering should be somewhat heavier toward the front than in the rear of the grate. The equivalent of about four shovelfuls per door should normally be sufficient. The doors of the different boilers are to be fired in alternation, always allowing an interval of at least three minutes between coverings of adjacent sections of grate in the same furnace. At the same time the rate of combustion is to be maintained at a maximum over all parts of the grate by leveling as required with a light rake and by keeping the grates clear and free of clinker and ash with chisel-edged hook."

"The installation of automatic damper regulators has made the operation of the individual boiler dampers, for the purpose of steam pressure gage control, no longer necessary. The individual dampers have, however, other very important uses. First, by adjusting these the draft should be regulated to give the proper air supply to the individual fire. For example, the freshly cleaned fire will require less draft than the heavy one. In this connection the condition which should obtain when boiler capacity is correctly scheduled, individual flue dampers properly set, and the automatic regulator being used to the best advantage, is that the air supply in every furnace will be such as to permit, or in fact necessitate, the fires being kept in the best of shape, in order to maintain the rate of combustion required. The condition of the fire here referred to is that existing when the grates are kept thoroughly clean by ash, the fire level burning brightly at every point, and every section of grate being covered lightly in proper order and at the instant it begins to show ash. When a boiler is banked or otherwise out of service, the individual damper should be kept tightly closed. The cleaning of a fire should be carried through as rapidly as possible. In order to avoid all unnecessary delay at this time one of the coal passers should always assist the fireman in cleaning his fire. Further to reduce the loss of heat, the flue damper is to be closed while the ash is being drawn from the grate. In banking a fire particular attention should be given to see that the grate is

entirely covered at every point, the individual damper and the ash pit doors tightly closed."

"When a boiler is to remain idle continuously for a period longer than twelve hours, its fire may to advantage be burned completely out. Under such circumstances, for the last quarter hour or so the fire should be burned low, as is usual before cleaning, at the same time so adjusting the feed as to allow the water level to fall within an inch of the bottom of the glass. When combustion has practically ceased, the flue damper, ash pit doors, and the feed valve should be closed tightly. After ten or fifteen minutes more the main stop valve should be closed and then the feed valve opened sufficient to allow the boiler to gradually fill to about one-half glass. The addition of this quantity of water will stop further steaming and obtain a maximum of heat within the boiler."

You will note in these instructions that no attempt is made to reduce the time of an operation except that when fire doors are open the work should be done as expeditiously as possible. Certain specific acts are to be performed under certain specific conditions. While all of the work is done methodically, it is not done as by a machine. Intelligence of the workman counts.

On taking charge of the plant the standard of boiler pressure was raised from the normal 140 pounds to 155 pounds gage pressure, and considerable attention devoted toward maintaining this pressure constant. A recording pressure gage was established and by calibration the boiler gages which were previously considered standard gave indications eight pounds above the actual. The recording gage was installed in the boiler room where it would be readily accessible to the firemen, and through its records not only has it afforded a constant check on boiler operation but by exciting a spirit of rivalry among the men has been of inestimable value in eliminating wide variations of boiler pressure.

Similarly the installation of a recording feed water thermometer also placed in the boiler room was followed at once by a marked improvement in boiler feed temperature. In this instance the records of the charts not only incited careful regulation on the part of the firemen, but by revealing excessive temperature variations, where the change of rate of flow through the heater should have been but slight, have brought to our attention defective operation of valves, pump governors, etc., which might otherwise have passed unnoticed.

Economy tests were made on all the main units of the plant, and from the results of these tests a diagram was plotted showing graphically the relative efficiencies of the three separate machines under all conditions of loading. At the same time a schedule was tabulated giving for every 100 K.W. of change in total system load the most efficient distribution of that load among the several machines at the steam plant and at the water power station. A blue-print copy of the diagram was posted in the engine room.

At the time that our betterment work began it was found that one side of the pump handling the jet condensers on two of the engines was inoperative, thus making the vacuum very poor. On the jet condenser, worked in connection with the turbine, there were various air leaks and the valves of the pump were in bad condition. With the installation of a new condensing equipment, the vacuum on all apparatus was greatly increased until 28 inches was maintained on the turbine and 27 inches on the engines under conditions of full load on the machines and injection water at 84 degrees Fahrenheit. By continuously going over the piping system to reduce air leaks and by repacking the low pressure exhaust valve stems on the engines, the vacuum was still further raised. However, it is only through constant vigilance on the part of all engineers that the above vacuua are maintained.

The switchboard we found to be dirty and with various loose connection in the wiring. In fact one connection was so loose that the marble panel was at all times too hot to touch. The switchboard instruments were all tested for accuracy and all of them calibrated.

Immediately after taking charge of the plant a schedule of systematic maintenance was prepared setting forth definite dates for the inspection and overhauling of all apparatus. At the same time, in order that the fullest benefit might result to those in charge of the plant from the experience gained in making such repairs or adjustments as might prove necessary, a log book was provided in which a certain number of pages were allowed to every piece of apparatus, proportional to the amount of attention which it was thought probable that apparatus would require, marginally indexed tabs being used to mark the several subdivisions. In this log book, it was intended that the results of all inspections, repairs made, etc., should be clearly recorded in detail. As this system has been elaborated, the chief engineer now has on his desk a card index for every day in the

year. Upon this index are instructions as to what examinations and inspections shall be made upon that particular day. If the inspection for any reason or other cannot be completed on that day, a note is made on a separate card which is slipped in in front of the next day's card, and the card for unfinished inspection is not taken out until the work is done. The ordinary plant calls for somewhere between seven and eight hundred different kinds of inspections repeated with varying frequency from a few hours to a few years. This box of cards is what one of our managers has named "The Automatic Chief Engineer." By following these sets of cards the cost of maintenance is reduced to a minimum and break-downs are practically unknown.

The putting into effect of the recommendations brought about by our betterment work necessitated a change in the chief engineer and his first assistant. These men did not seem to have the ability to adapt themselves to the changed conditions and did not have good control over their men. The "firing" of important men like these, however, is most unusual. Generally, the more intelligent the men the more readily they adapt themselves to the modern methods.

As a result of this work the coal consumption for equal loads is the equivalent of twenty-five per cent better than before the betterment work began. The saving in water for power represents an improvement of approximately sixty-six per cent. Savings in lubricants and waste are noticeable. The training of firemen has been carried to the point that it would be difficult to find better in the country. The placing in effect of a maintenance schedule has considerably increased the economy of the plant through forcing of steady, systematic inspection of all apparatus, resulting in keeping such station apparatus in prime condition. Engine and boiler schedules have been rearranged in accordance with the best-known efficiency of the apparatus. The revised schedules calling for the operation of the steam units in conjunction with the water power units, which are now run in parallel, have brought about a decided improvement. The installation of surface condensers has contributed throughout the station to the improving of economy. Boilers are now clean. The reduction of scale, from an average of one-eighth of an inch over all heating surfaces to nothing, could hardly help but have its effect. The feed water temperature has been raised and maintained at 210 degrees from a previous average of 185 degrees. The fluctuations in this tem-

perature have also been cut down to three degrees from a previous fluctuation of at least twenty degrees. The boiler pressure has been raised and is maintained at 155 pounds, with fluctuations of five pounds, as against a previous pressure of 135 pounds and fluctuations of 20 pounds. The switchboard instruments have been calibrated and are correct. A coal contract was placed which, from the standpoint of merit, quality and price considered together, was at least ten per cent better than the previous year's contract. The total manufacturing cost was reduced about twenty-six per cent.

I have outlined to you very hastily but in some detail a few of the problems that arise in the boiler and engine rooms of a public utility.

With a public utility, *production* ceases at the switchboard. The object of the plant is to turn coal into kilowatt-hours. In most manufacturing plants, power is but one of the costs, and generally a small one. In the manufacture of shoes for instance, I am told that to produce a pair of shoes which sells for about \$4.00 requires only two cents' worth of power. This is only one-half of one per cent. In a central station, speaking now of production alone, the cost of power is one hundred per cent. Cost, however, is but one factor to be considered in furnishing *service* from a public utility.

I know a large electric plant which furnished power at a price as low as any in the country, yet it could not build up its load. Why? Simply because it was unable to give service—the public would not put up with the interruption to which it was subjected. It was a water power plant and in summer the streams dried up—in winter they froze up. Heavy winds and sleet tore down the lines. Lightning destroyed the transformers. Service was anything but continuous. These troubles have all been corrected, service now compares favorably with that of the best companies in the country. No time studies were made, no stop watches were used, the machinery was not speeded up and no "tasks" were set, yet "scientific management" in its broadest sense was applied. The defects of design were remedied, the errors of management were corrected, the action of the elements was provided for. The management had in mind first and foremost "Service." Lower cost of operation came along with the improved service, but this was incidental. This company, like many others, has for its motto: "Service First," and service first is generally brought about by scientific management of the highest type.



SNAPSHOTS IN SOUTH AMERICA

THE photographs appearing on the following pages were taken by a correspondent of the Stone & Webster Engineering Corporation connected with the work of the Ulen Contracting Company in Uruguay on its contract for the construction of sewers and waterworks in Salto, Mercedes and Paysandu, Uruguay. Among the pictures are views in some of those cities, as well as photographs made in Rio de Janeiro, Bahia, Asuncion, Montevideo and Concordia.



2



3



4



5

SALTO, URUGUAY

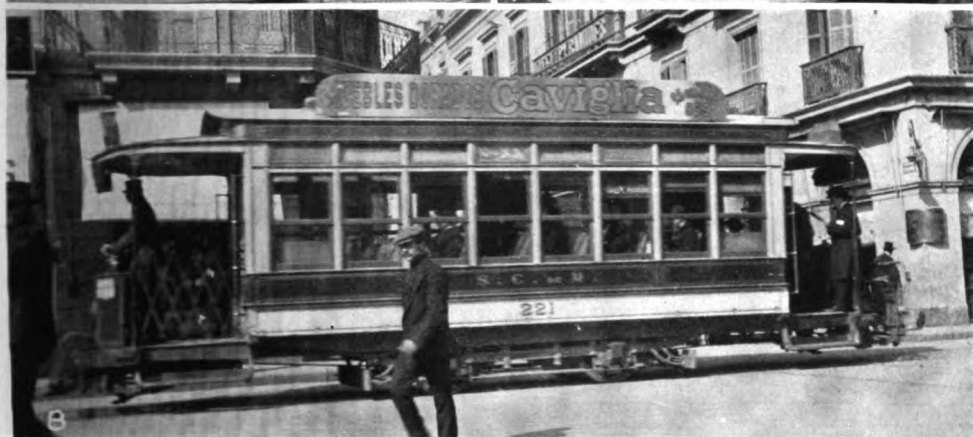
2. Cattle Brands. 3. Water Supply. 4. Horse Car Line. 5. Water Supply Distribution System.



6



7



8



9

6. Traffic Policeman. 7. Inspecting the "Alice," August 22, 1916. 8. English-owned Street Car Line. 9. Office Force Aboard the "Alice."



10. Fray Bentos, Uruguay. 11. Transportation at Paysandu, Uruguay. 12. Fray Bentos, on the Uruguay River.



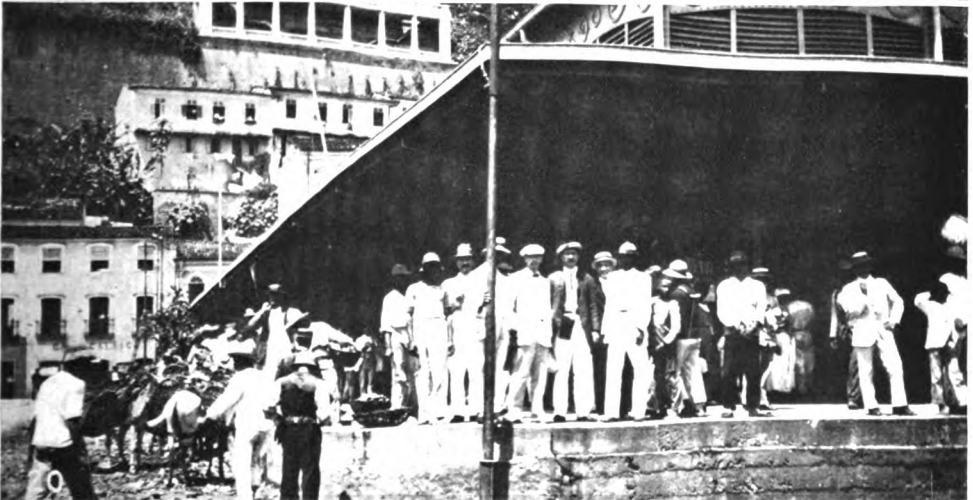
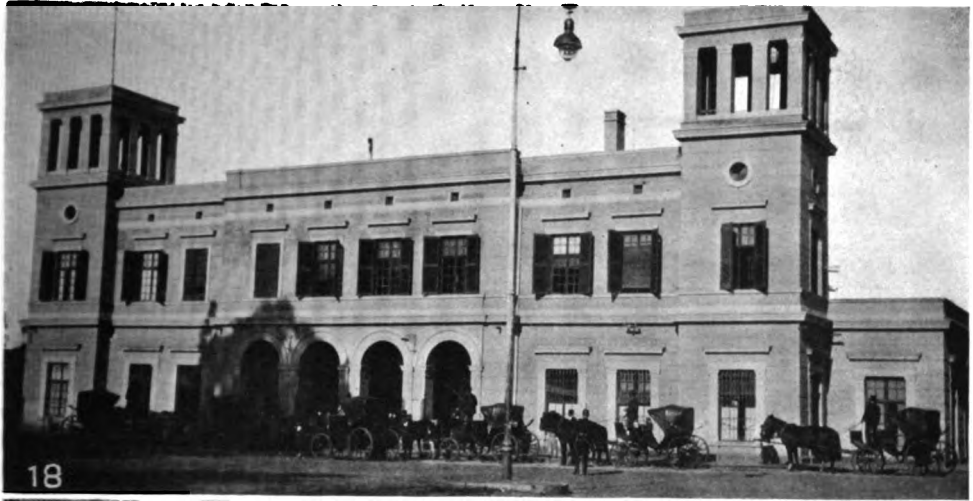
ASUNCION, PARAGUAY
13. Cigar Stand, Public Market. 14. Public Market. 15. Water Front.



17

BRAZIL

16. An Old Cathedral at Bahia. 17. Bamboo Grove at Rio de Janeiro.



18. Railway Station, Concordia, Argentina. 19. Old Fort at Bahia. 20. Market Place, Bahia.



21. Cement Pipe manufactured at Salto, Uruguay. 22. Removing forms from a 14-inch Cement Pipe one minute after it was cast. 23. Repaving street, Salto.

TECHNOLOGY'S PART IN PREPAREDNESS*

BY CHARLES A. STONE

Last June Technology celebrated her fiftieth anniversary. Each year for fifty years she has made her contribution of trained alumni to our country. Can she perform a service now to our national government by so organizing her alumni as to assist in the movement for preparedness which is the great need of the hour? Your Alumni Association believes that she can and has committed itself to assist the government through co-operation with the National Council of Research and the Council of National Defence.

Just at the close of the Civil War, Professor Rogers and a few broad-minded men in Boston realized that America's great need was for trained technical men prepared to attack and co-ordinate her great industrial problems. The mass of people in the United States neither understood nor appreciated its importance at that time. Half a century has rolled by, during which all the great nations of the world have been engaged in a struggle for industrial supremacy and expansion. This has now culminated in the most disastrous war known to history, of which the end is not yet in sight. And now the need of preparedness, both industrial and military, which President Rogers foresaw is forcibly impressed upon every thinking man and woman of the United States.

That preparedness requires technical training is not always appreciated, but the fact remains that technical training is the foundation for both military and industrial preparedness. It is the technically trained men who are fighting the battles today, on the sea, on the land and in the air, and it is the technical men at home who are showing the way for maintaining the industries in the war-stricken countries. Even in the countries now at peace the technically trained man is more than ever before in demand, for it is he who must devise ways and means of providing substitutes for the many things they can no longer import.

In the summer of 1914 Germany was prepared when other nations were taken unawares by the war, but her preparedness did not alone consist of military and naval equipment and means of producing them but of a large body of technically trained

*Presidential remarks at the annual meeting of the Alumni Association of the Massachusetts Institute of Technology at Hotel Somerset, Boston, January 6, 1916.

men ready to apply themselves to new scientific and industrial problems that were sure to arise. The orderly habit of the German mind had led the people to co-ordinate science and industry and when the need came each human unit of the great machine dropped automatically into its proper place and the German organization moved on like one great human being creating, developing, producing whatever the country most needed. Months elapsed before the other great nations involved were able to bring order out of chaos and a great advantage had been gained for the Central Powers.

The lesson of preparedness has thus been learned. England, France, Italy and Russia are fully awake now to the importance of preparedness. Every one of the belligerent countries has already made preparations for rebuilding such works as have been destroyed by war, and more than that in many cases elaborate preparations have been made for re-establishing foreign and domestic commerce and industry at the close of the war. More than ever before our foreign neighbors are on the alert to develop their own resources and turn to their advantage those of other countries. Whether they wish or no, they will have to make extraordinary exertion to recoup the losses they have suffered in the war. Accustomed to frugal living and accustomed also to working as a unit under military discipline, every one of the belligerents will be effectively equipped for accomplishment as never before.

Wherein lies future hope for America in this world struggle? *First*, in our realization of the need of preparedness to meet conditions that will arise as soon as the war is over or in case we become involved. *Second*, in prompt action on the part of our scientific and technical men in pointing out the things that America most needs in order to maintain and develop her industrial activities. *Third*, in pointing out to our government these needs and showing how help may be secured.

When the war broke out we were without dyes and even after two years some of our great mills are closed because dyes and chemicals cannot be secured. Our men of science are working on this problem and we are making progress. We are practically without nitrogen in America and if our supply of nitrates from Chile was cut off we would be without nitric acid and hence without powder and high explosives. Our government has awakened to the importance of this and has appointed an excellent commission to study the subject and show the way for

producing it electrically. In this case the scientific man was clearly the first to be needed.

But it is not enough that America's scientists should discover the means, but the technical men must push the discovery to complete development and make it practical. Eternal vigilance is the price of success and more than ever will eternal vigilance be required in the future.

An American, Robert Fulton, built the first steamboat, but we lost the art or at least the means of efficient steamship construction in this country for no good reason other than a foolish and short-sighted policy adopted toward shipping by our federal government. For years we have been able to build locomotives better and cheaper than other countries. For years we have been able to build bridges and steel structures cheaper than other countries. A steamship is a steel structure with a great locomotive to drive it, and as we could build the component parts cheaper than foreigners we ought to have been able to build the whole, but foreign governments fostered their shipbuilding industry while our government handicapped ours. Hence, we built no ships and owned no ships and foreigners controlled our foreign commerce. To the danger of this our own people have hardly yet awakened. In spite of this country's apathy on the shipbuilding question, Technology has for years been turning out men with special knowledge of shipbuilding problems and thus contributing to preparedness for one of our biggest industrial problems of the future.

This is but one example and there are countless other problems in which Technology men can be of untold service to our government and our country. And the reason lies in the fact that the scientifically trained man learns the art of intelligent research and acquires the power of analysis. He can ascertain the means by which certain results can be obtained. Besides this he can intelligently point out cause and effect to our people and our government, thereby fostering development of our industries and showing means of accomplishment. In short, the scientific and technical men of any country can more than any other class of men prepare the way and help develop those things which make a nation great, advance her prosperity and prepare for the future.

Let the Massachusetts Institute of Technology be the school whose Alumni and Faculty shall lead the way that others may follow.

DEMURRAGE

BY FRANCIS BROWN

Worcester's dictionary of the early eighties defines demurrage as money payable to the owner of a vessel as compensation for delay in loading or unloading on the part of the shipper or consignee. No mention is made of land carriers being entitled to the same balm; later works, however, do extend the definition to include railway trucks and vans as well as vessels. Just why an American authority should take refuge behind the foreign "truck" and "van" and not include our own standard "car" is not evident, unless one follows the derivation of the word deeper. For this we are referred to the verb *demur*, of very respectable Latin parentage, meaning to doubt, to pause, or to hesitate! From association with words of this calibre naturally has arisen the difficulty of justifying and collecting our erstwhile modest demurrage charges.

So long as commerce pursues the even tenor of its way, and railroads are encouraged to extend their facilities to match the expansion of their customers' business, by offering attractive return to new capital, little is heard of demurrage charges. Beyond a perfunctory assessment to cover the aggravated cases, no special interest is taken in the subject. When, however, in a time like the present, business excitement follows a period of depression with extreme suddenness, facilities of trader and railroad alike are taxed to the limit. The freight car is the unit of transportation, as much as the dollar is the unit of value, and during traffic congestion the car commands a premium. An idle car becomes a revenue loser for the railroad instead of a producer, and, therefore, when held idle by a consignee is made the subject of compensation on the part of the offender.

The question of cars held idle awaiting discharge goes far deeper than mere compensation for lost earning power, involving as it does, the factors of blockade and delay to others waiting to use the same equipment. Imagine for instance that a shipment is placed for delivery Monday. The consignee is allowed two full days to unload, a sufficient time to do the work carefully and systematically, and no demurrage begins to accrue until Thursday. Suppose, however, the car is not unloaded until Saturday. A charge of one dollar per day for Thursday, Friday

and Saturday is levied and the incident is closed theoretically. The actual effect on the yard is far from remedied, for terminal space is valuable when business is booming. This car occupied a spot for three days which might have accommodated someone else's car, and might have allowed another shipment to have been received instead of waiting its turn to be unloaded. This supposition considers only the simplest transaction and no mention is made of the extra switching required to take out adjacent cars which had been promptly released, but happened to stand behind the delinquent one on the same track. No account is taken of the problem of finding room for the car which had to wait just outside for three days while its consignee was clamoring for his goods. The case in point may seem childish as outlined for one single car, but the solution becomes a whole man's job when hundreds of cars are involved as at present. If you have any doubt, just take a trip back from Harlem river or Hoboken or Jersey City and note how the trouble has piled up. If, as is frequently stated, our railroads are the arteries of trade, their freight yards are the lungs, and commercial pneumonia is as dangerous as its human counterpart.

For the sake of illustration, imagine again: this time two rival wholesale concerns in the same business, the one with an ample warehouse, private siding, and all the facilities for conducting its own business, the other with an office and a telephone, and—a huge demurrage bill. The one pays taxes and wages, the other growls when it pays the railroad. Which, pray, is the greater asset to the city? When hundreds of freight cars stand still as temporary warehouses and cheap at the price, is it wholly the carriers' fault that a car shortage ensues? To carry the absurdity still further, why not expect the roads to provide offices and clerks as well as storehouses? Possibly they would if competition among them were as keen as some Utopians desire!

From a railroad point of view, demurrage money is not strictly compensation, but rather medicine aiming to counter-irritate disease instead of merely paying for it without attempting a cure. Was it St. Paul in writing to the traders of Corinth who first claimed that the way to a man's heart was through his stomach? He should have added that the way to his reason was through his pocketbook. *Ergo*, the only method to insure prompt unloading is to provide a fine for delay, and to make that fine heavy enough to command attention in real

money. Some economists have even proposed a geometric progression in levying demurrage, charging one dollar for the first penalty day, two dollars for the second, four for the third, eight for the fourth, and so on. This is so drastic as to be hopeless of enactment, but an arithmetic progression increasing one dollar per demurrage day after the first would at least grow expensive for chronic offenders.

Recognizing the seriousness of the situation which obtains at the present, the Interstate Commerce Commission on November 29 authorized a new temporary scale effective until May 1, 1917, which, although not as sweeping as the carriers had requested, still has teeth enough to demand respect. This tariff applies on any road three days after it has filed its formal acceptance with the commission. It continues the two free days allowed now, with an assessment of one dollar for the first day thereafter, two dollars for the second, three for the third and five for each subsequent one. Consignees are still allowed exemption on days when unloading is impossible on account of weather conditions, and the so-called "average agreement" is left in force. This latter clause provides that a concern receiving cars may, by unloading them at once, earn credits to offset debits on those held over the two days free time.

That Washington realized the handicap under which the railroads are operating is indicated by the fact that the allowance expires by limitation on the first of next May, and is intended to be only an emergency measure to meet special conditions. If relief is not in sight by spring it is to be hoped that the term will be further extended. In any event, the operation of the new tariff will be carefully watched by both the railroads and their customers, and the results obtained should be interesting when compared with conditions existing the past autumn.

Should the number of waiting cars be appreciably diminished under the new schedule, not only will the mobile fleet of cars be increased by the same amount, but yard and terminal facilities will be able to serve a larger volume of traffic; and movement of all business will be expedited, as in nearly all cases the capacity of a line is directly controlled by its ability to digest the stream of cars bound for its larger yards. If, on the other hand, no more rapid release of equipment is obtained, the railroads, particularly those at export points, will receive an increased income, now sorely needed to offset the uncom-

fortable per diem bills which interior roads are collecting. Railroad men are not in agreement as to forecasting the results which will occur under the new order, some maintaining that an increased efficiency will be obtained, others that merely a temporary revenue increment will be received. They are all united, however, in hoping for the former, not only as an economic relief, but also for the permanent value gained by demonstrating that promptness is possible when made compulsory. When the process of unloading without delay becomes a universal habit, one long gap toward the railroad millennium will have been filled.

Another advantage in directing a man's attention to his freight bills lies in the possibility of promoting a better understanding between trader and carrier on the lines of freight tariffs in general. Too many business houses pay their railroad bills without checking them, sometimes to their own loss, viewing the subject as too abstruse for the lay mind. Every charge in proper form is based on definite authority, which any person interested is entitled to see for himself. It isn't beyond the realm of hazy dreams to imagine that a mutual acquaintance of all concerned will help smooth the arguments which continually arise whenever any railroad charge is discussed. Possibly, also, the general public might learn to avail itself of facilities now existing, of which, through indifference, they do not know. Chambers of Commerce and Boards of Trade have tried to bring this about, with varying success, the subject being one in which every business is concerned, whether its members appreciate it or not.

DEVELOPMENT OF A NATURAL RESOURCE AND ITS INFLUENCE ON MANUFACTURING

BY GEORGE K. HUTCHINS

So much has been said about our vast natural resources and about the great possibilities of their conservation for the service of mankind, yet so relatively little has been accomplished, that those who have not made a particular study of the subject may well ask why this condition, so utterly inconsistent with the spirit of progress and enterprise of the American people, exists. When a careful and thorough study of those developments which already exist is made, the facts only make more insistent the "Why."

It is true that, in many instances, the development of our great water powers calls for the investment of large sums of money, with promise of but modest returns. It is also true that losses have been incurred in some of these ventures, which is true of business ventures in all lines of endeavor. Broadly speaking, however, the underlying, fundamental conditions are inherently sound and permanent. Especially is this the case where careful investigations are first made and competent engineering skill, supplemented by commercial ability, is employed.

It may, therefore, be argued that capital should be available for these undertakings; that skill and ability exists; and that factories, mills and mines, chemists, metallurgists, and many other classes of industry, will use this power when made available.

There is one thing that stands out clearly and conspicuously, that is removed from the realm of probability or question to that of accomplishment—and it is, perhaps, the greatest in importance of them all—and that is the indisputable fact of the beneficial influence of the development of water power upon the development and growth of all kinds of manufacturing industry. Indeed, there are numerous instances of absolutely new and unknown industries being created and made possible by the development and through the use of water power.

Furthermore, the creation and development of these new and unique industries has exerted a profound and far-reaching influence upon many other kinds of manufacturing of a desirable nature. Articles of superior value to any before existing

are produced, new metals made available, and the realms of chemistry expanded into vast fields of great promise.

But it is for the purpose of giving a modest instance of a more prosaic character that this is written:—to tell something of the water power development on the Chattahoochee river at Columbus, Ga., and the influence it has had upon the growth of a single industry—that of the cotton mill.

It was about the year 1846 that the first textile mill was established on the banks of the Chattahoochee river at Columbus, and by the year 1852 the industry had grown to four establishments with a combined installation of less than 20,000 spindles. These mills used the mechanical water power derived from the river. Some of them survived, some disappeared.

In 1900 the first hydro-electric plant was built, at which time there were in actual operation five mills with a total capacity of less than 100,000 spindles. Three of these mills were steam driven. In anticipation of securing power from this development two large mills were immediately projected and built, one with 28,000 spindles and one with 20,000, which later added 10,000 more. An existing mill built a fine addition, with some 10,000 spindles, about 1904. The steam-driven mills abandoned their steam plants and installed electric power, and two additional mills were built in 1905.

In 1906 The Columbus Power Company was organized under the management of Stone & Webster and riparian rights secured for many miles above Columbus. The plant was improved and a steam relay added, and numerous industries, other than cotton mills, became users of the service. In 1907 a new mill of more than 12,000 spindles was built, and subsequently a wave of activity set in during which nearly every mill in Columbus increased its facilities, one addition alone being of 35,000 spindles. It is reasonable to assume that these additions were made possible by the ease and simplicity with which electric power could be adapted to existing plants.

In 1910 another mill was secured to locate in Columbus and the Goat Rock development was begun, which was completed in 1912. This plant, located about fifteen miles above Columbus, is designed for an ultimate capacity of 40,000 horse power and is connected by transmission lines with Columbus, West Point, LaGrange, Hogansville, Grantville and Newnan, in all of which centers electric power is served. Two years ago a mill added 14,000 spindles, and within the past year no less than

four mills have made important enlargements in Columbus, one of 22,000 spindles, one of 24,000 spindles, one of 25,000 spindles, and one of 10,000 spindles.

Columbus at the present time has eighteen cotton mills, controlled by ten corporations, with a total of 389,000 spindles, employing 9,000 operatives, and has the distinction of being the second largest cotton manufacturing center in the South.

Nor is this the whole story; hydro-electric power is not confined to one situation nor to a single locality; cotton mills eighty miles distant are driven by the power developed at Columbus. Mills at West Point, LaGrange, Hogansville, Grantville and Newnan are served just as successfully as those at Columbus, with the result that today more than 500,000 spindles are operated by the hydro-electric developments at Columbus.

Opinions and ideas with relation to water power and its development frequently held by the general public, are sometimes characterized by very curious and mistaken notions as to the real facts. For instance, the opinion is often encountered that the power costs nothing, or substantially nothing, after a development is completed, which of course is nonsensical, as a little study of the subject will disclose. Another curious idea, probably suggested by the fact that very large amounts of capital are usually required, is that water power companies must be rich and wealthy concerns that make large profits with great ease, which is equally fallacious.

As a matter of fact the real beneficiary of a water power development is the *user*—the industry that buys the power in competition with all other known means of producing it, because the user usually wants it—and gets it—at less cost. The employment of large capital, necessary in water power developments, and the volume of business derived therefrom, are facts that are very well illustrated by comparison with a single textile mill in Columbus, whose capital employed is less than one-fifth that of The Columbus Power Company, and whose annual gross earnings are five times as great.

When we stop to contemplate the tremendous and far-reaching influence upon what may be accomplished in the encouragement of manufacturing—the creation of new industry, the employment of labor, the stimulation to inventive genius and scientific research—and endeavor to picture to the imagination its results, the potentialities of even a partial development

of our great water powers, now going to irretrievable waste, assume such enormous proportions as to appear almost unbelievable.

Again that insistent question recurs—Why are these natural resources, so abundantly, so lavishly provided by Providence for the service of mankind, not developed?

, NEW USES FOR ELECTRICITY*

BY GUY E. TRIPP

Chairman Westinghouse Electric and Manufacturing Company

The past five years have seen a rapid and a very great increase in the use of electricity, and it may be interesting to examine existing fundamental conditions in order to determine whether or not such increase is likely to continue.

Broadly speaking, electric energy is used for three purposes, viz.:

1. For light and stationary power.
2. For transportation.
3. For industrial electrolytic processes.

Cost Per Unit

The separate consideration of these several uses may give a good perspective of the whole subject.

The costs per unit of capacity of an electric power station today are about one-third of such costs fifteen years ago when the steam turbine first began to be generally used, while the electric energy which each pound of coal produces has been increased 50 per cent. These results are due to radical improvements in almost every part of the power house equipment, and because the largest modern steam turbine has about twelve times the power which the largest reciprocating engine had fifteen years ago. Smaller fixed charges resulting from reduced installation cost, less coal because of the higher efficiency, and a reduced labor charge per unit of output due to the use of larger units have materially decreased the cost of steam electric power production, notwithstanding the big advance in the cost of coal per ton.

Electric power is no exception to the economic axiom that every price reduction broadens the use of a commodity; therefore, we have seen electric light grow from a limited luxury to almost the universal method of illumination, and, starting with only an occasional motor, electricity now performing almost every known kind of power service. The incandescent lamp itself yields nearly three times as much light as formerly with the

*Reprinted with permission from the Annual Financial Section of the *New York Times*.

same energy, while the tremendous increase in the number of types and sizes of motors specifically adaptable to all sorts of uses may be perhaps best illustrated when I state that my company alone manufactures some 3,450 standard motors, each differing from every other in some radical feature. These improvements have naturally stimulated the use of electric power, while the steady advance in the price of fuel on the other hand has so raised the operating cost of private plants as to induce many of them to close down and buy current from the large central stations.

Far From Saturation Point

The foregoing conditions are stable and no one believes, as to power consumption, that the saturation point has been approached, much less reached; therefore, a reasonable assumption for this class of service is that there will be an increased broadening demand for a long time to come.

With respect to my second classified power use, transportation, the equipment of urban and interurban trolleys has heretofore largely occupied the manufacturing facilities for electrical apparatus used in transportation. There are indications that the period of rapid expansion in this field has passed and that hereafter we may expect only a moderate demand due to repairs and replacements and to the normal increases of existing roads.

With respect to steam railroads, however, the situation is radically different. Although almost every class of heavy railroad service is successfully performed by electrical equipment well past the experimental stage, the percentage of the total mileage of the country so operated is as yet insignificantly small. A necessary and proper prudence for a long time deterred the railroads from investing heavily in electric systems before their practicability had been suitably demonstrated. Afterward financial uncertainties did not encourage them to invest capital which they were not obliged to invest. With the advantages of electrification demonstrated, and recognized, as they now have been, and assuming an improved market for their securities, the railroads will presently demand an equipment output of no small proportions.

New Application

There is another and a comparatively new application of electric power which may prove to be very important, but of

which as yet the possible development can only be surmised. The United States Government has recently placed contracts for the construction of four battleships to be propelled by electric motors supplied with current from steam turbine driven electric generators. The government engineers have concluded that the very substantial advantages afforded fully justify this radical departure from all previous practice. If the tremendous expansion in our shipbuilding industry now so freely predicted shall become a reality, the demand for electric ship propulsion equipment, following a successful demonstration on such a large scale as may be afforded by these battleships, may require facilities as great as those now employed in well-established lines of production.

My third class of service, namely, electrochemical processes, differs radically from the other two. Electricity is not simply an economy or a convenience in this class of service; it is an absolute necessity vital to the industry. It is used in large volumes and direct, i. e., it is not transformed into mechanical energy. Its cost generally is so large a proportion of the total cost of the commercial product sold that only a very low price for current permits the industry to exist. The science of electrochemistry is making wonderful advances, and its arts have become essential to the needs of our country. Nitrogenous products for munitions and for agriculture—abrasives, aluminum—are among the important creations. Even greater achievements are confidently predicted, but the fullest measure of success seems inseparably linked with the assurance of an ample supply of cheap electricity so far only afforded by water powers.

This brings us to a consideration of hydroelectric developments. Although the demand for electricity for every purpose has increased by leaps and bounds, although the diminishing coal supply has greatly increased the cost of fuel and accentuated the need of conserving the nation's deposits, and although improvements in the art of transmission have made water-generated power available hundreds of miles from its source, hydroelectric development in contrast to other branches of the industry has of late years lagged far behind.

A peculiar situation is largely responsible for this. The bulk of the available power is in the west; that is to say, the thirteen so-called western water power states are estimated to contain 69 per cent of all the country's commercially developable water power, and in these thirteen states the Federal Government

owns and holds as public domain over two-thirds of all the land. The result is that 96 per cent of this power can be developed only by occupying some part of this public domain, and existing federal laws grant only a permit revocable, without recourse, at the discretion of a government officer. Such an uncertain tenure has deterred investors from risking the loss of their capital.

Similarly, a considerable portion of the power not located in these western states is on navigable streams, and the law forbids hydroelectric developments on such streams except by specific Congressional enactment for each individual undertaking. The difficulty of securing such enactments has very largely prevented development, and as long as these conditions continue it is unsafe to expect much progress. However, new remedial laws are before Congress; and, if they should pass in a form that will insure reasonable safety to capital, a most serious handicap to the utilization of a valuable natural resource will have been removed.

Progress Helps Progress

Naturally progress in one direction stimulates progress in another; that is to say, the possibility of obtaining cheap power is no small inducement to a steam railroad to electrify, particularly through mountains where heavy grades require more power per ton. In turn such electrification brings cheap power to every establishment along its line.

There has never been a time when there were more good reasons to expect a healthy growth to continue. We have passed the time when electricity could be said to be in its infancy, but it would be venturesome to assert that it has yet arrived at full maturity.

THE COST OF URBAN TRANSPORTATION*

BY RUSSELL ROBB

Studies in the Cost of Urban Transportation Service is a book that should have a special interest for the economist. Facts about any business are difficult for the outsider to get, and the economist has frequently to do pretty broad and far-reaching reasoning from a rather restricted basis of concrete information. There is no doubt that all the discussions involving tariff, wages, interest, profits, regulation, etc., would gain much in directness, accuracy, and usefulness if it were possible to have, about all branches of business, the sort of information that is given so fully in this book about the street-railway business. The information is frankly presented by the street railways themselves, having been prepared for the purpose of putting before the public the difficulties of the present situation.

The book is the outgrowth of the work done by the Bureau of Fare Research of the American Electric Railway Association. Mr. F. W. Doolittle was chosen as director of this bureau, and he has here given a comprehensive summary of the results of studies and investigations of the factors affecting the cost of passenger transportation service. The discussions seem to be free from special pleading, and a student of street-railway problems will find a great amount of information.

Only a few years ago street railways were looked upon as one of the most conspicuous examples of private enterprise prospering unduly because of monopoly privilege. The protestations of the companies that this was not true received little attention until the inroads of the automobile on transportation earnings became obvious to everyone. If this new factor in transportation were the only disturbing element, the problem would be less interesting because it would be only a case of a new product lessening the demand for an old one. The automobile, by taking away business, has, however, accentuated the economic structure of the street-railway business, and there have been brought out more plainly the influences and economic tendencies to which the business is subject.

Great changes may be brought about in the financial con-

*These remarks are reprinted from the November, 1916, *Journal of Political Economy*, where they appeared in the form of a review of F. W. Doolittle's *Studies in the Cost of Urban Transportation Service*.

dition of a property by changes in the investment cost for each dollar of gross receipts, or by changes in the operating expenses for each dollar of receipts, or by changes in the rate of return that will be attractive to the investor. The interplay of these influences is at times counteracting and at other times becomes cumulative.

With the ordinary business one may raise the selling price of the product if operating expenses increase; the street railway has a fixed fare. If to care for additional business requires greater investment for a dollar of receipts than formerly, the ordinary business may rest content with the amount of business already done, but the street railway must take care of increasing business regardless of increased investment for a dollar of receipts. If a rise in the rate at which investors are satisfied will not permit of new investment for new business, the ordinary business does not increase. The street railway must, however, care for the business that offers, even if something is taken from the returns to the old investors in order to get new ones.

If the street-railway business were one with returns always increasing with increased business, conditions would not be permanently onerous, but the comparison between large and small properties does not give evidence of these increasing returns. As a matter of fact, it is some of the larger street-railway systems that give the greatest evidence of distress.

Increased gross business tends in some directions to increasing returns, for with the same haul expenses do not increase in proportion to additional riding, and some items like power and some of the general expenses grow less per ride as the business grows larger. On the other hand, much of the new business comes from outlying districts where the haul is long, and gross earnings frequently increase only because of extensions. The longer haul for the same price per ride tends to decreasing returns. It seems to be true that any street railway doing its duty or looking after its selfish interest will make new investment for any new business that will yield an attractive return on the additional investment, thus causing a tendency toward earnings as a whole that will yield no more than a minimum attractive return on the investment that the business requires.

Any business in which there is not a tendency toward increasing returns with increasing business and investment, is in danger of getting into difficulties if the additional investment is dictated, not by the needs and advantages of the business, as

a business, but by some other influence, such as general social advantage. Investment that is economically wise for street railways depends upon the amount of new receipts it produces, upon the cost of operation for each dollar of new receipts, and upon the return on investment that is attractive. If new investment is forced upon it for expensive bridges, or paving, or other things that do not increase the receipts or decrease the operating expenses or lower the rate of return that will prove attractive, then the margin of profit quickly disappears and the property cannot take care of its legitimate extension. When this condition occurs, the attractive rate of return for new investment is also likely to rise, making the situation still worse.

When for any reason the operating ratio becomes higher, it becomes impossible to spend so much for the new plant necessary to care for a unit of new business if a return that will be attractive is to be secured. Thus with the street railway anything like automobile competition which thins out the gross receipts per mile of track and per car mile cuts in two ways. It results in a higher operating ratio because of thinner business and it also necessitates a larger investment for a dollar of new business because there must be more than the normal plant of track, cars, paving, power house, etc., to care for a unit of thin business.

Many of these principles are of course always more or less vaguely recognized, but it is usually felt that the margin of profit in a monopoly like urban transportation is sufficient to make it unnecessary to reason about the principles very closely. A careful reading of this book will be likely to astonish one at the amount of study, investigation, and calculation the street railways have been put to, in understanding and meeting their problems.

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The manager of the companies operated by Stone & Webster write to Stone & Webster Management Association about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Brockton, Mass., December 7th:

Bank clearings for November, 1916, were \$10,693,100.

Savings bank deposits for November, 1916, were \$13,304,750, against \$12,194,900 last year.

Post office receipts for November, 1916, were \$23,529.

During November, 1916, 48 building permits were issued, valued at \$164,354, against 42 last year, valued at \$96,730.

Brockton shoe shipments for the eleven months ending November 30 show an increase of approximately 125 cases over the corresponding period of 1915. For the month of November, 1916, the shoe shipments were 59,412 cases, against 42,754 cases last year.

Practically all of the shoe factories have now started on their new runs and report plenty of orders for the winter.

It is reported that the George E. Keith Company have done a little over 10 per cent of the export business of the United States in shoes, and that 21 per cent of the shoe merchandise going to Europe is shipped by the Keith Company. An interesting article appeared in one of the local papers recently to the effect that a shipment of shoes made in April, 1915, to Teheran, Persia, via the Pacific Ocean, India, the Persian Gulf and 500 miles over the desert on camel back, has just reached its destination.

The Sterling Motor Company, a local concern formerly making motorcycles but now making munitions, is completing its order for a million shells for the Russian Government. The shells are being turned out at the rate of 10,000 daily, the factory running on night and day shifts.

A plan has been completed by the W. W. Cross Company, tack and shoe nail manufacturers, for an addition to their present plant estimated to cost about \$10,000.

Canton, Mass., December 1st:

General business conditions are as good as previously reported.

The Plymouth Rubber Company are making a large addition to their mill, and there have been quite a few new houses started during the month.

Fall River, Mass., December 7th:

Bank clearings for November, 1916, were \$9,488,324, against \$6,762,-178 last year, and \$4,928,301 in 1914.

During November, 1916, 41 building permits were issued, against 39 last year.

Post office receipts for November, 1916, were \$14,294, against \$14,845 last year, and \$11,711 in 1914.

Notwithstanding the very high price of cotton cloth a month ago, other advances have since taken place, and the heavy demand for the products of Fall River mills still continues.

The receipts of the Fall River Gas Works Company were very favorably affected last month by the high price at which coke from the coal-gas plant was sold, and this condition will, it is thought, continue throughout the winter.

Fort Madison, Ia., December 9th:

Bank clearings for November, 1916, were \$1,140,631, against \$1,053,838 last year.

Post office receipts for November, 1916, were \$2,220, against \$1,861 last year.

General business conditions showed a slight improvement during November. The Perfection Tire & Rubber Company increased its load appreciably and expects to be operating at high capacity in a very short time. The other industries are nearly all operating at capacity.

The Iowa Tool Company is erecting several new buildings just outside of the prison walls, which it expects to have ready for use about the end of December. Our company will furnish them with approximately fifteen horse power of energy as soon as they begin operations in the new buildings. The Iowa Chair Company, a prison industry, has erected a large frame building and a small brick boiler-house outside the prison walls. We are now arranging to furnish them horse power for their motors and lighting.

It appears to be definitely settled that the Sinclair Oil Company, which has acquired a right of way for its pipe lines to cross the country, will locate a refinery here.

The general business outlook remains very satisfactory. The recent decision of the Santa Fe Railroad to give certain of its employees Christmas presents equal to 10 per cent of their year's salary, will stimulate the local retail sales of which our company should receive a fair proportion.

Bank clearings at Dallas City for November, 1916, were \$363,444, against \$281,056 last year.

Post office receipts at Dallas City for November, 1916, were \$293, against \$334 last year.

Galveston, Tex., December 5th:

Bank clearings for November, 1916, were \$31,352,000, against \$20,734,000, and \$16,540,000 in 1914.

The volume of business for the month of November, 1916, was \$124,366,000, against \$103,044,000 last year, \$92,752,000 in 1914, and \$90,615,000 in 1913.

During November, 1916, 160 building permits were issued, valued at \$7,858, against 259 last year, valued at \$101,869.

Post office receipts for November, 1916, were \$14,898, against \$17,287 last year.

The heavy figure for 1915 was due, of course, to the general repair

work following the great August storm. Business in Galveston still continues light, though cotton and wheat shipments for November show an increase over the same month last year. Cotton shipments were 257,473, against 198,296 bales last year, and wheat shipments for November, 1916, were 1,251,837 bushels, against 1,025,000 bushels last year.

The coal shortage existing throughout the country has been felt in Galveston. Dealers here have been able to obtain only a little coal from the eastern mines by rail and have, therefore, chartered a sailing vessel, which will bring to Galveston the largest dead-weight cargo of coal that has ever entered this port, about 6,000 tons.

Haverhill, Mass., December 13th:

The Haverhill Savings Banks report deposits on November 30, 1916, of \$13,658,130, against \$12,723,939 last year, an increase of 7.34 per cent.

During November, 1916, 24 building permits were issued, valued at \$91,050, against 27 last year, valued at \$78,300.

Shoe shipments for November, 1916, were 44,837 cases, against 40,511 cases last year.

General business conditions continue very good.

Houston, Tex., December 11th:

Bank clearings for November, 1916, were \$60,561,993, against \$50,557,192 last year, and \$34,102,254 in 1914.

Real estate transfers for November, 1916, were \$1,144,285, against \$659,873 last year, and \$683,904 in 1914.

During November, 1916, 254 building permits were issued, valued at \$185,923, against 417 last year, valued at \$200,255 in 1915, and 271, valued at \$98,476 in 1914.

Post office receipts for November, 1916, were \$53,586, against \$48,613 last year, and \$40,613 in 1914.

At the annual meeting of the Texas Company on November 14, it was voted to increase the capital stock of the company \$11,100,000, bringing the capital stock up to \$55,500,000.

The arrangements of the Farmers Union for the erection of a cotton warehouse on the ship canal, which shall be adequate for the handling of the entire cotton crop west of the Mississippi River, have been about completed and the construction work will be started in the near future.

General business conditions in Houston and the surrounding territory continue good, and the outlook for the future is very favorable.

The farmers and merchants in South Texas and the trade territory of Houston, are in better condition than for the past five years.

The receipts of the Houston Electric Company for November, 1916, showed an increase of 14.79 per cent as compared with the previous year.

Jacksonville, Fla., December 5th:

During November, 1916, 57 building permits were issued, valued at \$75,180, against 69 last year, valued at \$236,663.

Exports for November, 1916, were \$13,634, against \$5,974 last year.

Imports for November, 1916, were \$72,000, against \$43,945 last year.

Lumber shipments for November, 1916, were 24,148,460 feet, against 35,956,425 feet last year.

The number of vessels arriving and departing in November, 1916, was 131, against 255 last year.

There was no material change in general business conditions during November. A large tourist season is expected and it is understood that there will be an unusual number of moving picture companies operating in Jacksonville this season.

Keokuk, Ia., December 7th:

Post office receipts for November, 1916, were \$7,120, against \$6,582 last year.

General business conditions throughout this locality continue quiet in the case of retail houses, while the wholesale houses report substantial increases over last year.

Key West, Fla., December 7th:

Post office receipts for November, 1916, were \$1,635, against \$1,713 last year.

Custom-house receipts for November, 1916, were \$40,217, against \$32,688 last year.

Cigar manufacturers for November, 1916, were 7,594,000 cigars, against 4,279,000 last year. The large cigar factories report an unusual number of orders on hand for this time of year. They expect to keep their entire force in operation for the next three months without the usual holiday interruption, during which time they generally take inventory.

General business should, therefore, continue good.

Paducah, Ky., December 7th:

Bank clearings for November, 1916, were \$4,752,180, against \$3,035,-696 last year.

Generally speaking, business conditions continue to improve, and the improvement is reflected in the increased earnings of the Paducah Light & Power Company. Considering the fact that practically no tobacco has yet been marketed in this city, general business conditions may be considered even better than could reasonably be expected at this time.

General business conditions during the next few months are largely dependent upon the tobacco market. From present indications, the price the dealers are prepared to pay to the farmer will be much higher than last year, and possibly somewhat higher than for some years past, and this in spite of the fact that the crop in the western district of the state is much larger than usual. If the high price is realized, we should have an extremely prosperous winter in this section.

Pawtucket, R. I., December 11th:

The banks report a gain of 17 per cent in commercial accounts for November, 1916, over the previous year, and a gain of 13 per cent in savings accounts.

During November, 1916, 19 building permits were issued, valued at \$109,000, against 35 last year, valued at \$92,800.

Post office receipts for November, 1916, were \$13,127, against \$12,915 last year.

Good business conditions continue to prevail, with an ever-increasing demand for all lines of commodities, although lack of labor and raw materials is a heavy handicap to the manufacturer. All the mills are working overtime in an endeavor to catch up with their orders which are far behind.

The iron and steel industry is excellent. The mills are running at full capacity and many are running overtime.

Merchants are more than pleased with trade conditions. Business is on broad and generous lines and everyone is confident that the Christmas trade will be exceedingly satisfactory.

The earnings of our gas department for November, 1916, show a gain of 8 per cent over the previous year, and those of the electric department a gain of 16 per cent.

Savannah, Ga., December 13th:

Bank clearings for November, 1916, were \$39,968,701, against \$24,216,848 in 1915, and \$19,570,045 in 1914.

During November, 1916, 43 building permits were issued, against 45 last year.

Post office receipts for November, 1916, were \$26,044, against \$27,641 last year.

Cotton receipts for November, 1916, were 133,037 bales, against 113,164 bales last year.

Resin receipts for November, 1916, were 41,723 barrels, against 39,781 barrels last year.

Turpentine receipts for November, 1916, were 9,362 barrels, against 9,261 barrels last year.

Port business shows an appreciable increase. The high price of cotton and the activity in naval stores is having a material effect on this section.

Both our railway and our light and power receipts for November, 1916, show an increase over 1915.

Seattle, Wash., December 15th:

Bank clearings for November, 1916, were \$83,334,634, against \$54,942,458 in 1915, \$48,364,607 in 1914, and \$57,877,350 in 1913.

Building permits for November, 1916, were valued at \$481,325, against \$798,810 last year.

Real estate transfers for November, 1916, were \$792,127, against \$1,233,594 last year.

The month of November closed with conditions good in all lines of business. The jobbing and retail trade is beginning to reflect the effects of steady employment of labor at high wages. The lumber and flour mills are running at full time. Shipyards are running three shifts with bonus for quick launching.

The outlook is bright for the immediate future, though boom conditions do not prevail.

Sydney, Nova Scotia, December 12th:

During November 16, 7 building permits were issued, valued at \$13,000, against 3 last year, valued at \$3,000.

Customs receipts at Sydney for November, 1916, were \$21,315, against \$14,251 last year.

The output of the Dominion Coal Company for November, 1916, was 407,612 tons, against 297,057 tons last year. For the eleven months of 1916, the output was 4,373,591 tons, against 4,302,107 tons last year.

The shipments of the Dominion Coal Company for November, 1916, were 329,502 tons, against 256,174 tons last year. For the first eleven months of 1916, the shipments were 4,035,679 tons, against 3,992,406 tons last year.

There is little change in the conditions surrounding the steel and coal industries in Cape Breton. The former continues to operate at an unprecedented rate, while the coal companies still feel the lack of proper shipping facilities and are in the midst of an acute labor situation.

The outlook for coming months continues very satisfactory. Mercantile houses anticipate a record holiday trade.

Weather conditions were unsettled during November. About the middle of the month there was an unusually early fall of snow which remained for several days.

News from the Companies

Boston Office

On December 21, 1916, Mr. Samuel L. Shuffleton of the Stone & Webster Engineering Corporation, in charge of the construction of the steam power station of the Buffalo General Electric Company on the Niagara river, together with the Stone & Webster Engineering Corporation men associated with him in the work, was tendered a dinner at the Hotel Iriquois, Buffalo, by the Buffalo General Electric Company. Mr. Charles R. Huntley, president of the Electric Company, presided. About thirty-five persons were present. Mr. Shuffleton was presented with a loving cup.

Mr. R. M. Harding of Columbus, Ga. is at the Boston office.

Mr. Gardner Rogers of Houghton, Mich., has been at the Boston office recently.

Mr. Lawrence Weston of Paducah, Ky., was recently in Boston.

Mr. Harold F. Eastman, Harvard 1916, has joined the statistical department.

Mr. Nichols of Fort Madison, Ia., spent some days in Boston.

Mr. A. F. Townsend of Beaumont and Port Arthur, Tex., is at the Boston office.

Mr. Hardy Croom has returned to Jacksonville, Fla., from a visit to Boston.

Mr. George A. Campbell of Reno, Tex., has also visited Boston.

Mr. C. W. Kellogg of Keokuk, Ia., is now visiting Boston.

Mr. L. O. Murphy of Reno has recently returned to Reno, Nev., from a visit to Boston.

The engagement has been announced of Miss Margaret E. Daley, formerly of the Boston office of Stone & Webster, and during the past year with the American International Corporation in New York, to Dr. Frank D. Gulliver of New York.

CONFERENCE OF ASSISTANT TREASURERS AT BOSTON

On December 11 and 12 there assembled in the Boston office the assistant treasurers, or other accounting men, of most of the companies under the supervision of the Stone & Webster Management Association. This gathering was in response to an invitation sent out the latter part of November requesting that all the assistant treasurers meet in Boston to discuss certain subjects that it was important to have understood before the beginning of the new accounting year. Representatives were present from all the companies, with the exception of the Dallas Companies, Ponce, the Puget Sound Electric Railway, Puget Sound International Railway and Power Company, and the Bellingham Division of the Puget Sound Traction, Light and Power Company; unfortunately the representatives of these companies were unable to come, owing either to local conditions or to the distance to be travelled. Mr. Hovey's large room was prepared for the conference, which began its session Monday morning, December 11, at 10 o'clock. Mr. Webster greeted each man

on his arrival, and Mr. Sawyer then called the meeting to order and outlined the purposes of it.

The particular object of the meeting was to discuss certain changes in the Federal Income Tax Law, effective January 1, 1917, with especial reference to the question of handling Depreciation. The method employed by our companies for recording Depreciation has never been wholly acquiesced in by the Treasury Department at Washington, resulting in confusion and annoyance. The latter part of 1916 Mr. Sawyer suggested to the Treasury Department certain modifications of our accounting methods, which, while not required in any way by the Income Tax Law, would make our records so clear that no inspector could possibly misinterpret them. These suggestions were accepted by the Department, and as an evidence of good faith the deductions claimed for depreciation in previous years recently under discussion were approved and allowed.

Another matter that was deserving of discussion at that time was the new capital stock tax, returns for which had to be made and filed in January, 1917. There was also a desire to discuss intimately with the visiting assistant treasurers the relations between their local offices and the Boston office, in order that both the assistant treasurers and the Boston office might have a better idea of the individual problems that arise. Finally, there was a wish that the assistant treasurers might become better acquainted with each other and with those men in the Boston office who were working on their problems, to the end that there might be, if such a thing were possible, greater co-operation and esprit de corps.

It is planned to have prepared and sent to each of the assistant treasurers typewritten copies of the various talks and discussions, and it is the purpose of this article only to give a brief description of the meeting itself.

Monday morning was devoted to the discussion by Mr. Sawyer of the income tax problems and the understanding that he has arrived at with the Treasury Department. At one o'clock the meeting adjourned for luncheon, which was held in a private dining room at Young's Hotel, and at which were present, in addition to those attending the meeting, Mr. Robb, representing the firm, Mr. Hunt, Mr. Phinney and Mr. Sperry, representing the vice-presidents and district managers, and Mr. Whiting of the Stone & Webster Journal.

At 2:30 the meeting again came to order, when Mr. Merrill Griswold, from the law firm of Messrs. Gaston, Snow & Saltonstall, who have particular charge for us of income tax matters, addressed the meeting on some of the legal phases of the law, giving much valuable advice regarding the preparation of returns, the treatment of government inspectors, and other matters of importance.

Following Mr. Griswold, Mr. Daniels, of the statistics department, gave an outline of the work of his department, showing how the local offices could co-operate with him, and outlining in a most instructive way the purposes of the operating reports, indicating how important it is that they come in promptly and be made out in a uniform manner. He also discussed at length the insurance problem, the question of fidelity bonds, and the importance that attaches to them. He further described how real estate records were handled, and spoke of the care that should be given to them.

Mr. Crawford of the corporation department next touched upon the various matters that were common to his department and the accounting departments of the different companies, laying particular stress on the requirements of various mortgages.

Mr. Farnham of the treasurer's office discussed the handling of improvement requisitions, bringing out how important it is to show on the requisitions all details, in order that the officers in Boston may have all the facts on which to base their approvals and on which to submit their recommendations to the Boards of Directors.

Following Mr. Farnham, Mr. Patterson of the auditing department called for expressions of opinion on various matters that his department had found open to debate. This discussion was general and animated, and resulted in agreement on several points which will be the subject of circular letters outlining certain accounting changes.

Throughout the afternoon many questions were asked in connection with the talks that had taken place, and after each of the talks Mr. Sawyer emphasized the salient features.

At about 5:30 the meeting adjourned, and at 6:30 all met again at the Parker House for dinner, after which the visiting men and their hosts went to the Tremont Theatre to see Raymond Hitchcock.

On Tuesday morning, December 12, the meeting again came to order at 10 o'clock, and for an hour and a half viewed a demonstration of the recording machines manufactured by the Eliot-Fisher Company, and had opportunity to question the representative of that company regarding their special problems.

Following this demonstration Mr. Nichols discussed briefly a few matters that the treasurer's office wished emphasized, among them being the training of men in the local accounting departments for higher positions, and the drawing on the Boston office for young men for outside vacancies, thus giving an opportunity for promotion to those who make their beginning in accounting work in Boston. He also brought out the importance of accuracy in the financial reports and in the various commission and government returns, and outlined in a general way the provisions of the Federal Reserve Act pertaining to the clearing of checks at par. The assistant treasurers were advised to keep in touch with their local situation in order to take advantage of the first indication of changes that might be made that would allow funds to be transferred without exchange charges.

It was then time for luncheon, and small groups of men went out together, in order that they might become better acquainted.

On meeting again at 2:30, Mr. Whiting of the Stone & Webster Journal made a strong plea for articles for that Journal, which it is sincerely hoped may be forthcoming, since articles written by the men in the various companies have particular interest for the readers of the Journal.

Mr. Sawyer then summarized the discussions of the two days and answered many questions, relative not only to the work of the local offices, but also to that of the Boston office. So interesting was this discussion that the meeting did not break up until the latter part of the afternoon, when an invitation was extended to a few of the assistant treasurers who had never before been in the Boston office to stay on a few days, in order

that they might visit the various departments and get a more intimate view of the work done by each.

Representatives of the Boston office know that they gained much from this meeting, and it is hoped and believed that the visiting men gained as well. In fact it was generally agreed that the mutual benefits of this conference were so great that similar meetings should be held at least every three years.

There attended this conference at various times the following men:

Visiting Men

Anderson, W. Bernard	Pensacola Electric Company
Avery, Urban A.	Edison Elec. Ill. Co. of Brockton
Baker, Sidney E.	Fall River Gas Works Company
Best, William E.	Puget Sd., Trac., Lt. & Pr. Co.
Bissell, J. Hugh	Mississippi River Power Co.
Bissell, William N.	Houghton County Traction Co.
Brownell, Fred W.	Connecticut Power Company
Cate, Harry R.	Haverhill Gas Light Co.
Chase, George E.	Brockton & Plymouth St. Ry. Co.
Dexter, Forrest P.	Puget Sd., Trac., Lt. & Pr. Co.
Drew, Lionel E.	Savannah Electric Company
Fitzgerald, David F.	Cell Drier Machine Company
Flahive, Francis B.	Galveston Electric Company
Gannon, Francis J.	Northern Texas Traction Company
Harding, Harry L.	Houston Electric Company
Hart, Earl C.	Lowell Electric Light Corp'n.
Himel, Robert O.	Beaumont Companies
Hopkins, Fred L.	The Blue Hill St. Ry. Co.
Jordan, Leon E.	The Paducah Companies
Judd, William H. F.	El Paso Electric Ry. Company
Kennedy, William H.	Keokuk Electric Company
Miller, Peter M.	Jacksonville Traction Company
Neagle, Fred J.	El. Lt. & Pr. Co. of Abington & Rockland
Nichols, Alfred S.	Fort Madison Electric Co.
Prutzman, Ernest R.	Chase-Shawmut Company
Seaborn, Edward J.	Tampa Electric Company
Seay, James M.	Adirondack Electric Pr. Corp'n.
Shaw, William E., Jr.	Sierra Pacific Companies
Shepard, Ronald C.	The Key West Electric Co.
Spencer, Gordon G.	Cape Breton Electric Co., Ltd.
Stiness, George A.	Blackstone Val. Gas & El. Co.
Trull, Clifford	Port Arthur Companies
Wilbur, Arthur A.	Columbus Companies
Williams, Everett P.	Baton Rouge Electric Company

Boston Office Men

Adams, Ernest R.
 Allen, Charles H.
 Beckett, Walter W.
 Crawford, William T.
 Cronin, John J.

Daniels, Nathan H.
Eustis, Lawrence E.
Farnham, Fred H.
Hathaway, A. Homer
Henderson, Alfred F.
Hunter, Robert E.
Leighton, Jason C.
Mahoney, James B.
Nichols, John T. G.
Patterson, Alfred R.
Patterson, Edward L.
Sawyer, Henry B.
Sheridan, George W.
Skulley, Walter E.
Thomas, Paris P.
Vickery, Victor D.
Whitaker, Perley L.

Jacksonville, Fla.

Messrs. L. M. Bragg and Ray Carroll paid brief visits to this city recently, while en route to Key West, to be connected with the Key West Electric Company. Both made their start in the street railway business in Jacksonville.

Mr. W. M. Bird, formerly connected with the Jacksonville Traction Company, paid us a visit during the early part of December while en route to Tampa, where he becomes connected with the Tampa Electric Company.

Mr. P. M. Miller, our assistant treasurer, attended a meeting of assistant treasurers in the Boston office during the middle of December.

Mr. Tom Folsome, of the roadway department of the Tampa Electric Company, was a recent visitor.

We have recently added two sidings and extended another on the Ortega line.

The monthly meeting of the Safety First League was held December 1, and was attended by members from the various departments of this company. The meeting was held in a private dining room of the Hotel Mason and followed a dinner provided by the company.

The annual election of officers of the Jacksonville Electric Company Benefit Association occurred at a meeting held December 15, at the car barn on Riverside avenue. The meeting was attended by a large proportion of the membership, comprising employees in the various departments of the Jacksonville Traction Company.

The election was followed by a banquet lasting until after the last "owl" cars had been turned in for the night. The occasion was full of enthusiasm and was a decided success.

The first Duval County Fair took place December 5-9, inclusive, at Phoenix Park, and was very successfully conducted. The exhibits were not only from this county, but from several other Florida counties as well, and indications point to a State Fair to take the place of the County Fair next year. The total attendance was upward of 50,000.

An aviation training school has been established at the U. S. Camp Grounds at Black Point, near the city. The enterprise is a private one, and the equipment includes three hydro-aeroplanes and one tractor aeroplane, all of biplane type.

There are now several moving picture producing companies at work in Jacksonville, and others are arriving almost daily. One company is fitting up a studio upon this company's property at Phoenix Park.

Bi-weekly passenger and freight steamer service will be established between Jacksonville and Nassau, commencing the first of January.

Keokuk, Ia.

The first cold weather of the winter season reached Keokuk and vicinity during the second week in December. The lake above the dam and the power station forebay were partially frozen over on December 14. Navigation was officially closed on December 1, but some movement of government boats and other craft continued until the initial freeze up on the 14th, when the last steamboat passed through the lock.

On December 11 word was received at Keokuk that this city had been selected as one of the possible sites for a government armor plate plant.

The November meeting of the High Tension Club was held on Tuesday evening, November 21. An address on "Co-operation" was made by Mr. Hazen I. Sawyer, a member of counsel for the Mississippi River Power Company. The annual election of officers for the coming year resulted as follows: president, F. J. Venning; first vice-president, R. V. Sprague; second vice-president, Paul Newell; secretary, George A. Kirchner; treasurer, J. H. Bissell.

Mississippi River Power Company

The Keokuk Electro-Metals Company, an electric furnace industry, manufacturing ferro silicon, has recently signed a contract for sufficient additional power to increase its plant to three times its original size. In view of the fact that this company has been in operation only since April, 1916, it is very gratifying to note that the growth of its business demands such an addition to present plant, buildings and equipment in this short space of time.

Mr. Kellogg left Keokuk early in December on a trip to Houghton, Paducah and the Boston office.

Mr. L. H. Knapp, St. Louis representative, has recently been transferred to the power sales department of the Houghton County Electric Light Company. As a result of this change Mr. F. O. Jorstad of the statistical department at Keokuk has been transferred to St. Louis.

On December 7, Mr. J. H. Bissell, assistant treasurer, left for Boston to attend the meeting of assistant treasurers from all Stone & Webster companies, which was held at the Boston office on December 12 and 13.

Keokuk Electric Company

The Standard Four Tire Company has let the contract for its new addition. This building will be used for an office and warehouse and is expected to be completed in about four months.

Satisfactory progress is being made on the extension of the McKinley

avenue street car line, and it is expected that cars will be in operation over this line before the first of the year.

Mr. J. P. Ingle, manager, recently visited Des Moines, to attend a meeting of the Iowa Section of the National Electric Light Association.

Mr. William H. Kennedy, assistant treasurer, left for Boston on December 7, to be present at the meeting of the assistant treasurers from all Stone & Webster companies.

Mr. J. P. Donnovin has left the employ of the company and his position as floor salesman is now filled by Mr. Otto Hill.

Contract has been let and work begun on a new button factory plant of the Mississippi Pearl Button Company, to be located at Warsaw, Ill.

Key West, Fla.

Key West is nearly a three-million-dollar-a-month port. The value of exports and imports through Key West for the month of October totaled \$2,781,840. All other ports in Florida totaled \$1,480,227.

Mr. R. G. Carroll, recently acting manager at Beaumont, Tex., assumed management of The Key West Electric Company on December 9. Mr. I. M. Stover, former manager, has been assigned to the management of the Baton Rouge Electric Company.

Mr. Stover and family left for the East Coast on the evening of the 13th, and after visiting Philadelphia, Boston and Baring, Me., will proceed to Baton Rouge, La.

J. Larcom Ober, superintendent of distribution of this company, has been appointed assistant secretary of the engineering department of the Stone & Webster Engineering Corporation.

R. C. Shepard, assistant treasurer, left on the 4th of December for Boston to attend a conference of assistant treasurers of the Stone & Webster Organization.

During the past two weeks, the torpedo boats, *Smith*, *Lamson* and *Monahan* visited this port. The cruiser *Chicago* will arrive at this point in January and will be stationed here permanently. A submarine flotilla is due here shortly for maneuvers.

The American Telegraph and Telephone Company has leased the Recio building, at the corner of Duval and Caroline streets, for a period of fifteen years.

Mr. Lester M. Bragg, formerly of Savannah and Tampa, but recently in the Boston office, arrived December 7 to fill a vacancy in the sales department.

Paducah, Ky.

Mr. C. W. Kellogg, district manager, was with us for three days in the middle of December.

Our assistant treasurer, Mr. Jordan, has just returned from an eastern trip during which he attended a meeting of assistant treasurers. Mr. F. B. Flahive, formerly assistant treasurer here, returned with Mr. Jordan and spent a day with us.

Mr. W. L. Weston was present at the annual meeting of the Kentucky Association of Public Utilities in Louisville on December 6.

Pensacola, Fla.

Under the terms of a new contract recently entered into by the city of Pensacola and the Pensacola Electric Company, the Electric Company will replace all gas and gasoline street lights in the city with 60 candle-power electric lights. Most of the gas lamps are in the down-town section, and the gasoline lamps are in the outlying districts. About 150 lights in all will be replaced.

A bowling league has been formed among the employees of the Pensacola Electric Company, composed of four teams, one each from the office, transportation, light and mechanical departments. Two games a week are played and a prize will be given to the winning team and to the highest individual scorer.

Mr. A. H. Warren of the Galveston Electric Company, formerly manager of this company, is spending his Christmas holidays in Pensacola.

Mr. W. B. Anderson, assistant treasurer, has returned from a week's visit to the Boston office.

The first dirigible balloon to be built for the U. S. Navy has arrived at the Aeronautic Station and is being assembled for test. It will be known as the D.N.-1. The new balloon is cigar-shaped, about 175 feet long and 35 feet in diameter, with powerful motors driving the propellers. It is expected that trial trips will be made in the near future by pilots at the Aeronautic Station.

A flotilla of submarines, with parent ships, is expected soon for winter maneuvers in the Gulf, using Pensacola as a base.

A large number of new air planes of the latest type of construction have been received at the Aeronautic Station within the past few weeks and the old machines have been practically discarded. Two hangars capable of accommodating about nine machines each have recently been completed, and contracts will shortly be let for six additional of the same type.

Now that the 1917 appropriation is available, it is expected that great activity will be seen at the Aeronautic Station. At the present time a class of twenty-two officers and two hundred enlisted men are in training in the various branches of aeronautics. Many of these men are from the Naval Militia and they will be required to train for three months.

Savannah, Ga.

Mr. W. B. Purse recently returned from his vacation, which he spent in New Jersey.

Mr. L. E. Drew attended a convention of assistant treasurers, held in Boston early in December.

The line department recently completed an extension which furnishes light and power to the new plant of the Savannah Warehouse & Compress Company. This plant, which is located about four miles above the city on the Savannah river, is expected to handle the storing and compressing of practically all the cotton which comes to this port. The low warehouse rates and the perfect protection from fire offered by the new organization are expected to be the means of drawing through Savannah a much bigger proportion of the cotton crop than previously.

The bowling league has commenced operations again at the com-

pany's alleys near the car barn. The teams are more evenly matched than last year, and for this reason interest in the games has been very well sustained. The six teams represent the conductors, motormen, equipment, line and wiring, power plant and office. The wiring team is in the lead by a narrow margin at present.

The corner stone of the Municipal Auditorium was laid Thursday, December 14, with the usual Masonic ceremonies. The people from all South Georgia towns were invited to come to the city for the occasion. After the dedication the visitors were given an oyster roast at the Yacht Club grounds. Street dancing was the feature of the evening, and was quite successful in spite of the chilly weather.

The line from Charleston, S. C., to Savannah, now being built by the Seaboard Airline Railway Company, will be in operation about the first of the year. Several weeks ago a party of bankers made a trip over the extension but had to ferry over one of the rivers. When this last bridge is completed, Savannah will be about two hours nearer the North and East than before.

Seattle, Wash.

The Stone & Webster Club of Washington held the first meeting of the 1916-17 season at Tacoma on the night of November 15, a two-car train of the Puget Sound Electric Railway leaving Seattle at 5 o'clock in the evening, taking the members from Seattle, Everett and Bellingham to the "City of Destiny," arriving there at 6:15. The dinner, preliminary to the meeting, was at the Tacoma Hotel, where the "Viking" room had been set aside for the initial gathering.

President G. A. Richardson presided. The business section of the meeting was confined to matters connected with membership, after which addresses were delivered by Rev. Dr. E. H. Todd, president of the Puget Sound College, and President Ralph S. Stacy of the National Bank of Tacoma. Dr. Todd's talk was on the "Head Man," and Mr. Stacy's related to the "Federal Reserve Bank" Act. The special train returning to Seattle was started away at 10:15. The meeting was in every way interesting and profitable.

The first meeting this season of the Electric Club was held in the Contract Department of the Electric Building, Seattle, November 29, with President R. W. Clark in the chair. There was a musical programme, and an address by Kenneth Kerr, editor of the *Railway & Marine News*, who spoke of Seattle's future as a world port. Owing to the fact that the date immediately preceded the Thanksgiving football game between the University of Washington and the University of California, and to the further fact that the coming event was being emphasized by the students in their "shirt tail parade," the attendance from the Railway Department at the Electric Club meeting was light, traffic men being busy on the down-town streets. Other departments were well represented.

The smoker planned for November 29, at which intercity contests between Seattle, Tacoma, Everett and Renton boxers were expected to take place, had to be postponed until after the holidays, owing to the inability of Tacoma to supply its share of the card. It is not expected by the promoters of the smoker that the meeting will be held before Feb-

ruary, owing to the heavy demands upon time during December and January.

Mr. George Quinan, engineer of this company, who was called to the Boston office with Sales Manager Gille, and who has been absent since October 11, returned to Seattle December 2. Mr. Quinan visited the manufacturing plants of both the General Electric and Westinghouse companies while on this trip.

President A. W. Leonard, General Counsel James B. Howe, General Accountant F. P. Dexter, and Auditor W. E. Best, left Seattle Tuesday, December 5, for Boston and New York, expecting to return before the holidays.

The Electrical Show, as a part of Seattle's observance of America's Electrical Week, had a large attendance.

Noticeable progress on the 55,000-volt transmission line between Buckley and Palmer is reported. The new line will feed the Palmer coal mining district. About fifteen miles of high tension line, six miles of 2300-volt line, two outdoor substations and feeders to five coal mines are included. Heavy timber clearing and difficult work in swampy ground had to be contended with. The line is now about eighty-five per cent complete.

Woonsocket, R. I.

At the regular bi-monthly meetings of the Employees' Club, interesting talks, creating lasting impressions, were given by W. W. Hall of the Westinghouse Electric and Manufacturing Company on "Advertising," and Mr. J. V. Landreth of the Long-Landreth-Schneider Company on "Water Heaters."

Much enthusiasm and a great deal of friendly rivalry are being manifested in both the pool and bowling tournaments.

The following auditors are making the annual audit of the company's books: Mr. P. L. Whitaker, Mr. H. J. Albricht, Mr. B. T. Johnson.

COUPONS AND DIVIDENDS DUE

	Per Cent
Jan. 1, Blackstone Valley Gas and Electric Company 5s, 1939.....	2½
Jan. 1, Cape Breton Electric Company, Ltd., 5s, 1932..	2½
Jan. 1, Columbus Electric Company 6s, 1917.....	3
Jan. 1, Columbus Electric Company, Preferred Stock, 6 per cent.....	3
Jan. 1, Connecticut Power Company, The, 5s, 1956...	2½
Jan. 1, Eastern Texas Electric Company, Preferred Stock, 6 per cent.....	3
Jan. 1, Eastern Texas Electric Company, Common Stock, 5 per cent.....	2
Jan. 1, Electric Light and Power Company of Abington and Rockland, The, Capital Stock.....	4
Jan. 1, El Paso Electric Company 5s, 1932.....	2½
Jan. 1, Everett Water Company 5s, 1921.....	2½
Jan. 1, *Haverhill Gas Light Company, Capital Stock.	2¼
Jan. 1, Houghton County Electric Light Company 5s, 1927.....	2½
Jan. 1, Houghton County Street Railway Company, The, 5s, 1920.....	2½
Jan. 1, Houghton County Traction Company, 5s, 1937	2½
Jan. 1, Keokuk Electric Railway & Power Company 5s, 1925.....	2½
Jan. 1, Mississippi River Power Company 5s, 1951....	2½
Jan. 1, New London Gas and Electric Company, The, 5s, 1933.....	2½
Jan. 1, Northern Texas Electric Company 5s, 1940....	2½
Jan. 1, Northern Texas Traction Company 5s, 1933....	2½
Jan. 1, Paducah City Railway, Inc., The, 5s, 1932....	2½
Jan. 1, Paducah Street Railway Company, Inc., 6s, 1920	3
Jan. 1, Paducah Street Railway Company, Inc., 6s, 1923	3
Jan. 1, Pawtucket Electric Company 5s, 1938.....	2½
Jan. 1, Pensacola Electric Company, 6s, 1919.....	3
Jan. 1, Reno Power, Light & Water Company 6s, 1944	3
Jan. 1, Savannah Electric Company 5s, 1952.....	2½
Jan. 1, Savannah, Thunderbolt and Isle of Hope Rail- way, The, 4s, 1947.....	1
Jan. 1, Sydney and Glace Bay Railway Company, Ltd., 5s, 1932.....	2½
Jan. 1, Woonsocket Electric Machine and Power Com- pany 4½s, 1931.....	2¼

*Payable quarterly.

	Per Cent
Jan. 10, El Paso Electric Company, Preferred Stock 6 per cent.	3
Jan. 15, Keokuk Gas Light and Coke Company 5s, 1918	2½
Jan. 15, *Puget Sound Traction, Light & Power Company, Preferred Stock	\$.75
Feb. 1, Baton Rouge Electric Company 5s, 1939.	2½
Feb. 1, Dallas Electric Corporation Coupon Notes, Feb., 1917.	2½
Feb. 1, *Edison Electric Illuminating Company of Brockton Capital Stock	2
Feb. 1, Everett Railway, Light and Water Company 5s, 1941.	2½
Feb. 1, Everett Railway, Light and Water Company, Capital Stock	1¼
Feb. 1, *Fall River Gas Works Company, Capital Stock	3
Feb. 1, Houston Electric Company 5s, 1925.	2½
Feb. 1, *Jacksonville Traction Company, Preferred Stock	\$.75
Feb. 1, Key West Electric Company, The, 5s, 1956.	2½
Feb. 1, *Lowell Electric Light Corporation, The, Capital Stock	2½
Feb. 1, Pensacola Electric Company 5s, 1931.	2½
Feb. 1, *Public Service Investment Company, Preferred Stock, 6 per cent.	1½
Feb. 1, Puget Sound Electric Railway 5s, 1932.	2½
Feb. 1, Puget Sound Traction, Light & Power Company 6s, 1919.	3
Feb. 1, Railway & Light Securities Company, Preferred Stock, 6 per cent.	3
Feb. 1, Railway & Light Securities Company, Common Stock	3
Feb. 1, Seattle Electric Company, The, 5s, 1929.	2½
Feb. 1, Seattle Electric Company, The, 5s, 1930.	2½
Feb. 1, *Sierra Pacific Electric Company, Preferred Stock	1
Feb. 1, *Keokuk Electric Company, Preferred Stock, 6 per cent.	1½
Feb. 15, *Tampa Electric Company, Capital Stock.	2½

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

DECEMBER 31, 1916

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PRF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	99	No	Prof	8%	168
Baton Rouge Elec. Co.	{ Bond, 1939 Notes, April, 1918	5% 6% 91 99½	6%	90		.....
Blackstone Valley Gas & Elec. Co.	5%	101	*6%	105	8%	160
Blue Hill St. Ry. Co., The	5%	90	No	Prof		.....
Brockton & Plymouth St. Ry. Co.	4½%	90		50		
Cape Breton Elec. Co., Ltd.	5%	90	6%	82½	3%	35
Central Mississippi Valley Electric Properties	No	Bonds	*6%	75		12 N
Columbus Elec. Co.	{ Bonds, 1933 Notes, July, 1917	5% 6% 85 100	6%	82½		35
Columbus Power Co., The	5%	92		.....		.....
Connecticut Power Co., The	5%	97½	*6%	95		100
Dallas Elec. Co.	{ Notes, Jan., 1921 Notes, June, 1917	6% 5% 100 99½				
Dallas Electric Corporation	{ Bonds, 1922 Notes, Feb., 1917	5% 5% 100 100		.....		.....
Eastern Texas Elec. Co.	{ Bonds, 1942 Notes, Dec., 1918	5% 6% 94 100	*6%	91	5%	65
Edison Elec. Illg. Co. of Brockton	{ Bonds, 1930 Notes, March, 1921	5% 5% 100 100	No	Prof	8%	185
El Paso Elec. Co.	5%	99	6%	100	10%	120
Fall River Gas Works Co.	No	Bonds	No	Prof	12%	252
Galveston Elec. Co.	5%	92		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	80 ^B _L	.....	35 ^B _L
Galveston-Houston Elec. Ry. Co.	5%	92½	No	Prof		.....
Haverhill Gas Light Co. (Stock par value \$80)	No	Bonds	No	Prof	9%	97
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	95	6%	22	5%	16
Houghton County Traction Co.	5%	90	*6%	85		45
Houghton County St. Ry. Co., The	5%	98	No	Prof	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	99 ^B / _L		.....		.....
Jacksonville Elec. Co.	5%	95	No	Pref	No	Com
Jacksonville Traction Co.	^{Bonds, 1931} ^{Notes, March, 1917}	5% 6% 85 100	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	95		.....
Key West Elec. Co., The	5%	75		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	227
Mississippi River Power Co.	5%	76 ^A / _B		37 ^A / _B		11 ^A / _B
Northern Texas Elec. Co.	5%	93	6%	85 ^B / _L	4%	55
Northern Texas Traction Co.	5%	100	No	Pref		.....
Pacific Coast Power Co.	5%	98	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	75 L		10 L		3 L
Pensacola Elec. Co.	^{Bonds, 1931} ^{Notes, March, 1919}	5% 6% 88 99	*6%	75		12
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	85		40
Puget Sound Elec. Ry.	5%	80 B		.....		.....
Puget Sound Power Co.	5%	95	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	^{Bonds, 1919}	6% 100	*6%	68		27
Railway & Light Sec. Co.	^{First Series, 1935} ^{Second Series, 1939} ^{Third Series, 1939} ^{Fourth Series, 1942} ^{Fifth Series, 1944} ^{Sixth Series, 1946}	5% 5% 5% 5% 5% 5% 99 99 99 99 99 99	*6%	98	6%	95
Savannah Elec. Co.	5%	70 ^B / _L		20		5
Seattle Elec. Co., The	^{1st Mortgage, 1930} ^{Cons. & Ref., 1929} ^{Seattle-Everett, 1939} ^{The Seattle Ry., 1921}	5% 5% 5% 5% 100 B 95 92 100	No	Pref	No	Com
Sierra Pacific Elec. Co.	^{Notes, April, 1916} ^{Notes, April, 1919}	6% 5% 100 99	*6%	72		5
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	100	No	Pref	10%	128
Whatcom County Ry. & Lt. Co.	5%	92	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange. L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights.

LIBRARY NOTES

"Increasing Car Operation Economies" is a complimentary copy that we have received from the limited edition of the Railway Improvement Company, New York. It is an advocate of that company's coasting recorder and accessories, with the claim on the last page that the foregoing discussions demonstrate that there is no reason to assume that efficiency of a car's operation is something that cannot be accurately measured and automatically recorded.

"Putnam's Word Book; a Practical Aid in Expressing Ideas through the Use of an Exact and Varied Vocabulary," by Louis A. Flemming, copyrighted in 1913 under the title "Synonyms, Antonyms, and Associated Words." We have the first edition of March's Thesaurus, which is bulky for handling, and we have Soule's Synonyms, which is generally absent from the Library, and this new acquisition is likely to be much appreciated for looking up synonymous terms.

The following accessions hardly need comment, as their titles define them so well: "Trust Laws and Unfair Competition," by Joseph E. Davies, Commissioner of Corporations, issued by the Department of Commerce, Bureau of Corporations; "Sources of Nitrogen Compounds in the United States," by Chester C. Gilbert, of the Smithsonian Institution; "Preparedness and America's International Program," issue of the Annals of the American Academy of Political and Social Science for July, 1916; "Abstract of Special Bulletins, Wealth, Debt, and Taxation, 1913," issued by the Bureau of the Census in 1915, and received by us this year.

"Co-ordination" was the general title of a meeting of librarians in New Haven, December 8-9, in the interests of the Special Libraries Association, Eastern District. The committee consisted of Mr. Herbert O. Brigham, State Librarian of Rhode Island, Messrs. H. C. Wellman, of Springfield, John G. Moulton, of Haverhill, and G. W. Lee, of Stone & Webster. One result of the meeting was the vote that The H. W. Wilson Company, of White Plains, N. Y., be requested to establish an employment bureau for librarians. Mr. Wilson being present, virtually accepted the offer, and until further notice the address of that company will be considered the headquarters for this purpose. Another result was the appointment of the committee

to prepare a report and probably arrange for a further meeting in February. This will give an opportunity for special librarians to refer their problems to the committee, and have them discussed, and solved as far practicable, at or before this meeting.

The special libraries of Boston are being described by Mr. Ralph L. Power in the *Boston University News*, the series beginning November 14.

The Annual Report of the Director of the Mint for the year ending June 30, 1916, contains, among other things, monetary statistics of foreign countries, values of foreign coins, world's production of gold and silver since 1860, and much other data concerning the two precious metals.

"*What a New System of Management Did for Us*" is the title of a reprint from the *System Magazine*, written by Joseph Husband (formerly with Stone & Webster, and author of "A Year in a Coal Mine"), and edited by John S. Reynolds, president of The Pullman Company. It is an interesting fifty pages on efficiency.

"*The Honor System of Contracting*" is the title of a paper read before the state meeting of the American Society of Civil Engineers, at Dallas, Tex., October 20, 1916, by Fred A. Jones, and reprinted in pamphlet form. It deals with the lump-sum and cost-plus systems from various viewpoints.

The Annual Report of the Department of City Transit, Philadelphia, for the year ending December 31, 1915, is a volume of 850 pages, and will be interesting as a reference book; among other reasons, on account of the various contract forms, franchises, leases, etc., which may furnish good suggestions for other undertakings.

"*Tractive Resistance to a Motor Delivery Wagon on Different Roads and at Different Speeds*" is Bulletin No. 10 of the Research Division of the Electrical Engineering Department, Massachusetts Institute of Technology. The fact that it was written by A. E. Kennelly and O. R. Schurig vouches for its being a valuable contribution to knowledge. It was read before the American Institute of Electrical Engineers at the Cleveland meeting, in June last. The illustrations, diagrams, tables, and bibliography, make it a good reference pamphlet, though there are less than thirty pages.

List of Publications of the United States Bureau of Foreign and Domestic Commerce, corrected to 1916, is a timely publication in these days when America is seeking foreign trade.

Among the headings are: Special bulletins; Special agents' series; Special consular reports; Tariff series. It has also a supplementary typewritten list.

"*List of References on Child Labor*" is the title of Industrial Series No. 3, Bureau Publication No. 18, of the United States Department of Labor, Children's Bureau. Besides being a bibliography, it has bibliographies of bibliographies, and it not only lists articles on child labor in the United States, but also in foreign countries. It has lists classified by industries, educational aspects, health of the working child, etc. When in a pamphlet of 162 pages we have both an author and a subject index we must recognize it as a fine piece of bibliographical work.

"*Steel Designing*," by Edward Godfrey, is one of our most recent accessions, though not a new work, the copyright being 1913. The author has intended it for all classes of men who have to do with structural steel: Student, inspector, draftsman, college instructor; the author himself having been a draftsman, inspector, instructor, and designer, and therefore acquainted with the needs of the several classes.

The International Engineering Congress index volume is divided into three sections: I. Historical and statistical; II. Abstract of papers; III. Table of contents and author index. While there is an author index, there is no other index, but simply over 200 pages of contents, abstracts, historical treatment, etc., the twenty-five pages of classified contents serving, as far as practicable, as a subject index.

"*Union Lists of Periodicals*" is the title of a prospectus by The H. W. Wilson Company. The sample page of check list of periodicals suggests how useful the work would be. It tells us, for instance, that Volume I of the Annals of the American Academy of Political and Social Science is dated 1890, and that that publication has been indexed in part by Poole, the Engineering Index, and the Readers' Guide, and still continues to be indexed by the Readers' Guide. There is still more condensed information than this, which is likely to be needed by the reference worker.

"*A Survey of Typical Co-operative Stores of the United States*," being Bulletin 394 of the United States Department of Agriculture, is likely to be of interest for those who through co-operative buying are trying to reduce the cost of living.

The Preliminary Report of the President of the American International Corporation (Mr. C. A. Stone) contains a great

deal of information regarding that corporation. The paragraphs headed Pacific Mail Steamship Company, Allied Machinery Company of America, Uruguayan Contract, Latin-American Corporation, Rosin and Turpentine Export Company, International Mercantile Marine Company, United Fruit Company, American International Terminals Corporations, and others, tell in brief of the varied interests of this well-known world undertaking, which is but a little over a year old. It is interesting to note that propositions have come from almost every conceivable part of the world, including Madagascar and the Belgian Congo.

"The Port of Boston; a Foreign Market for the Surplus Products of New England" is the title of an interesting pamphlet of fifty-eight pages, given out by the National Shawmut Bank. It ends with a bibliography on port administration and the essentials of foreign trade.

The Report of the Secretary of Commerce for the year 1916 is something with which the librarian should be familiar, because it not only describes the work of the Department of Commerce, but forecasts, in recommendations made by the secretary, work that is likely to be done in the near future. He recommends that there be an intermediate census of manufactures between the five-yearly takings that come under the law. He also refers to bills pending providing for an annual statistics on forest products, and likewise says that the financial statistics of states should be an annual undertaking, the first of which appeared for the fiscal year 1915.

Register and Business Directory, 1915. This was given us by one of the banking houses of Boston, and its usefulness is apparent if only for the street directory arranged according to the numbers of the street and numbers in the buildings. We often have a definite idea of where a certain concern is located, but do not recall its name. This will help us.

The Municipal Index, published by the Municipal Journal, for the years 1913, 1914, and 1915, respectively, promises to be a useful reference work. Comparing it with the Industrial Arts Index and the Engineering Index, one sees right away there is need for co-ordinating these undertakings. The entries in the Industrial Arts Index are in dictionary order, and easy to find, but they are brief in length. The entries in the Engineering Index are partly alphabetical. But those in the Municipal Index are classified only in the subject order, with no attempt at diction-

ary arrangement. Their value, therefore, is as a general bibliography rather than in the looking up of specific references.

The Boston Elevated Library, on application, received from the Library of Congress some typewritten and mimeographed lists of references on various topics, mostly of recent date. These have been loaned to our library, from which we have made note of the titles, as follows: *Boycotts and injunctions* in labor disputes (1912); *Eight-hour working day* (supplementary—1911); *Employers' associations* (1912); *Employers' liability* and workmen's compensation (additional—1912); *Employment agencies*; *Industrial arbitration* (supplementary—1916); Labor in the Commonwealth of Australia and New Zealand (1913); *Minimum wage* question (1915); *The open shop* (supplementary—1916); *Productivity of labor* in agricultural industry (1915); *State regulation of wages* (1914); *A minimum wage* for women (1913). In the annual report of the Librarian of Congress there is also reference to such typewritten lists of the past year.

Thomas' Register of American Manufacturers and First Hands in All Lines. This large volume is kept in the Purchasing Department, but contains information likely to be wanted by other departments. Inspect the inside cover page for a list of contents. Note the index to advertisers, the American trade name index, representative banks, commercial organizations, trade papers, National Association of Purchasing Agents, the divisions of the book that would not ordinarily be associated with the title. The Library has again and again been asked for various trade names, and this source of information may prove exceedingly useful.

Missing Books. The Library would appreciate the location of any of these and their return at as early a date as practicable:

Sprague, Charles E.: *The accountancy of investment.*

French, George, ed.: *New England, what it is, and what it is to be.*

Brown's *Directory of American gas companies, 1916.* (This is kept regularly in the engineering department, gas division.)

Poor's *Manual of Industrials, 1916.*

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil Engineering)

- 1 Structural engineering. Book three: steel designing. Edward Godfrey. Chicago [c1913], 492p, 4x6½. *0773.G543
- 2 Contracts, specifications and engineering relations. D. W. Mead. First ed. New York, 1916. 535p, 6x9. *07.M461
- 3 "The honor system of contracting" . . . F. A. Jones. unsp., 6x9. *073.J693
- 4 Building construction: industrial plants . . . power stations . . . constructed by S & W Engineering Corporation. 2d ed. 56p, 7½x6, illus. *610.B868.1916
- 5 Artesian water for irrigation in Little Bitterfoot Valley, Montana . . . U. S. Geological Survey, Water Supply Paper 400-B. Wash., 1916. 37p, 6x9, illus, map. W S I 400-B
- 6 Report on irrigation surveys and inspections, 1915-16. Department of Interior of Canada. Ottawa, 1916. 86p, 6½x9½, illus. *7200.In8ir. 1915-16
- 7 The measurement of silt-laden streams . . . U. S. Geological Survey. Water Supply Paper 400-C. Wash., 1916. (13p), 6x9. W S I 400-C
- 8 Annual report of Water Supply Commission of Pennsylvania, 1915. Harrisburg, 1916. 403p, 6x9½. *1803.1915
- 9 Accuracy of stream-flow data . . . U. S. Geological Survey. Water Supply Paper 400-D. Wash., 1916. (8p), 6x9. W S I 400-D
- 10 Surface water supply of the United States, 1914. Pt. I: North Atlantic slope drainage basins . . . U. S. Geological Survey. Water Supply Paper 381. vp, 6x9, illus. W S I 381
- 11 Surface waters of Mass. . . . U. S. Geological Survey. Water Supply Paper 415. Wash., 1916. 433p, 6x9. illus. W S I 415
- 12 The flow of water in wood-stave pipe. F. C. Scobey . . . with discussion . . . U. S. Department of Agriculture. Bulletin No. 376 . . . Wash., 1916. 96p, 6x9, illus. *6880.B376
- 13 Annual report of Governor of Panama Canal for fiscal year ending 6/30/16 . . . Wash., 1916. 635p, 6x9, illus. *6807.1916
Maps and diagrams accompanying same. *6807.1916m
- 14 Statement of floating plant owned by United States and employed in engineering department at large for fiscal year ending 6/30/15. Wash., 1916. (907p), 6x9. *6831.F65

(20) Electrical, (40) Mining

- 15 Handbook on incandescent lamp illumination . . . Edison Lamp Works of General Electric Co. Harrison, N. J. [c1916]. 212p, 3x5½. *0711.G286
- 16 Street lighting schedules for 1917. Issued by Electrical World. 1 sheet, 15x20. *0711.E12.1917
- 17 Proceedings of 9th annual convention of Northwest Electric Light & Power Association . . . Seattle, 9/6-8/16. 223p, 6x9. *6924.1916
- 18 Tractive resistances to a motor delivery wagon on different roads and at different speeds. A. E. Kennelly and O. R. Schurig. (30p), 6x9, illus. *07122.K391
- 19 Bibliography of Arizona mining, metallurgy and geology . . . University of Arizona, Bureau of Mines, 1915-16. Tucson. 49p, 6x9. *5900.M664.096
- 20 Publication of Bureau of Mines, Nov., 1916. Wash., nd. 27p, 6x9. *6876.096.1916

(50) Railways

- 21 Proceedings of American Electric Railway Engineering Association, 1915. 622p, 6x9½, illus. *6944.1915
- 22 Proceedings of American Electric Railway Accountants' Association, 1915 . . . 165p, 6x9½, illus. *6941.1915
- 23 Annual report of Department of City Transit of City of Philadelphia for year ending 12/31/15. 849p, 6½x9½, maps. *1891.T687.1915
- 24 Statement of . . . New York, New Haven & Hartford Railroad Co. for year ending 6/30/16. 71p, 6x9. *052.N48.1916
- 25 Report of Public Service Commission of Mass. regarding capital expenditures, investments and existing contingent liabilities of New York, New Haven & Hartford Railroad . . . Boston, 1916. 317p, 6x9. *1407.052

(71) Sociology and Education

- 26 Succeeding with what you have. C. M. Schwab. 10p, 6x9. *029.Sch91
- 27 What a new system of management did for us. Joseph Husband. Edited by J. S. Runnells. [Reprinted from System Magazine.] 1916. 50p, 6x9½, illus. *029.H951
- 28 The world's greatest battle: the war against accidents. R. J. Bodmer. Wash. [c1916] 48p, 6½x10, illus. *029.B632
- 29 Le foyer de la documentation. Institut du Mois Scientifique et Industriel . . . unp, 6x9. *084.In75
- 30 Special libraries of Boston. A write-up in each issue of Boston Univ. News by B. L. Power. *085.P871 (date)
- 31 Typical questions for college students. G. W. Lee. 1 typewritten sheet, 8x11. *601.Q38

(75) Financial, (76) Legal

- 32 The Morris plan of banks. L. N. Hammerling. In the American Leader, 11/23/16. (Published semi-monthly by American Association of Foreign-Language Newspapers, Inc.) *025.H183
- 33 Accurate appraisals by short methods. J. G. Morse. (Paper presented A. S. M. E., 12/5/16.) 15p, 6x9. *024.M837
- 34 Annual report of Director of Mint, fiscal year ending 6/30/16, also report on production of the precious metals in calendar year, 1915. Wash., 1916. 286p, 6x9. *6827.1916
- 35 Acts passed by General Assembly of State of Louisiana . . . May, 1916. Baton Rouge, 1916. vp, 6x9. *3100.031.1916
- 36 The Public Service Commission law of West Va., Nov. 1, 1915. 22p, 6x9. *2400.036
- 37 Public utilities reports annotated . . . 1916E. Lawyers Co-operative Pub. Co. Rochester [c1916]. 1222p, 6½x9½. *035.L449.1916E

(80) Statistics

- 38 Annual report of Secretary of Commerce, 1916. Wash., 1916. 259p, 6x9, illus. *6890.1916
- 39 Second annual report of Chief of Foreign and Domestic Commerce . . . fiscal year ending 6/30/16. Wash., 1916. 97p, 6x9. *6890.C73.1916
- 40 Report (of Federal Trade Commission) on co-operation in American export trade (in two parts). Part I: Summary and report, June 30, 1916. Wash., 1916. 387p, 6x9. *6892.C788.Pt. I
Part II: Exhibits. 597p, 6x9. *6892.C788.Pt. II
- 41 The port of Boston: a foreign market for the surplus products of New England. National Shawmut Bank. [c1916.] 57p, 6x9. *1461.P83.027
- 42 Ninth annual report on statistics of municipal finances for city and town, fiscal years ending between Nov. 30, 1914 and March 31, 1915. Mass. Bureau of Statistics. Boston, 1916. 301p, 6x9. *1402.M92.1916

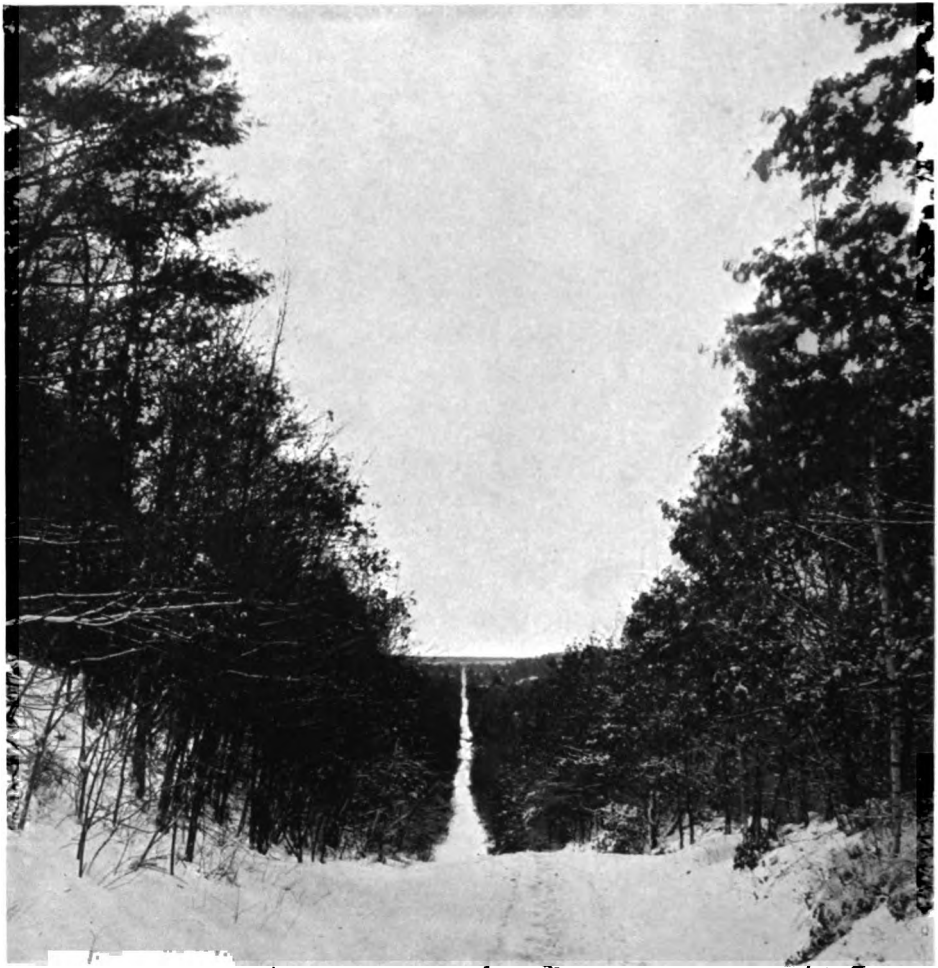
- 43 Comparative railway statistics, U. S. and foreign countries, 1918. Bureau of Railway Economics. Wash., Nov. '16. 78p, 6x9. *022.B89sf.1913
- 44 Fourth census of State of Florida . . . 1915. Tallahassee, nd. 78p, 6x9. *3606.026.1915
- 45 Annual report of Federal Trade Commission for fiscal year ending 6/30/16. Wash., 1916. 63p, 6x9. *6892.1916

(90) Sources of Information

- 46 Clark's Boston Blue Book for 1917 . . . Sampson & Murdock Co. Boston [c1916]. 954p, 4½x7, illus. *1461.C55.1917
- 47 The Boston register and business directory, 1915. Sampson & Murdock Co. [c1915] 993p, 6½x9½, map. *1461.093b.1915
- 48 New York City at a glance: guide street directory map . . . 191p, 8½x6½. *1791.066
- 49 Hammond's guide map of New York City, Manhattan and the Bronx. 18x36. *1791.061
- 50 Thomas' register of American manufacturers . . . Thomas Publishing Co. New York [c1916]. vp, 10½x12½. *093.T361.1916
- 51 Canada year book, 1915. Ottawa, 1916. 707p, 6½x9, maps. *7200.02.1915
- 52 The Municipal Index: an index to current municipal literature and a list of important books on municipal subjects . . . Aug., 1912-Dec., 1918. Reprinted from second issues each month of Municipal Journal. New York. Same for years 1914 and 1915. *096.M925
- 53 Transactions of International Engineering Congress, 1915: index volume. San Francisco, 1916. 273p, 6x9. *6987.096
- 54 Bulletin of Massachusetts Institute of Technology: Catalogue of officers and students . . . Dec., 1916. 530p, 6x9. *1461.T22c.12/16
- 55 The America labor year book, 1916. Prepared by Department of Labor Research of the Rand School of Social Science. New York [c1916]. 382p, 5x7½. *09.R157
- 56 Bulletin of American Library Association, Sept., 1916: Handbook, 1916. (98p), 7x10. *6991.093.1916

Miscellaneous

- 57 American International Corporation: preliminary report of president . . . 12/6/16. unp, 6½x9½. *054.Am3527p.1916
- 58 Proceedings of twenty-second annual meeting of U. S. League of Local Building and Loan Associations . . . Wash., 7/27-29/14. 233p, 5x7½. *6905.1914
- Secretary's annual report . . . 1916. 19p, 6½x10. *6905.Se25.1916
- 59 A survey of typical co-operative stores in the United States. U. S. Department of Agriculture. Bulletin No. 394. Wash., 1916. 32p, 6x9, illus. *6880.B394



ON THE NORFOLK AND BRISTOL TURNPIKE

In most of the Massachusetts charters it was required that the road should be built in as straight a line as possible.

STONE & WEBSTER JOURNAL

FEBRUARY, 1917

EDITORIAL COMMENT

This issue of the Journal contains a paper upon the Cleveland municipal lighting plant which should be of exceptional interest to students of municipal activities. After briefly reviewing the history of the Cleveland plant, it analyzes a recent audit of the books of the enterprise and makes a brief study of the possibilities of future profitable operation. It appears that, contrary to the repeated claims of the plant management, there has been a steady loss, which has accumulated to considerable proportions. While there is a possibility of some improvement, there seems to be no probability that this plant so widely advertised will ever fully pay its way; on the contrary, it looks as if it were bound to be a drain upon the city's taxpayers so long as present rates are maintained. The Public Utilities Commission of Ohio acted wisely in prescribing a standard system of accounts for municipal utilities, requiring that such utilities be charged with all services, supplies and funds furnished by other city departments, and that past deficiencies be corrected, so that in future the accounts of such utilities shall reflect their operations as definitely and accurately as has long been customary with private plants.

* * *

The true situation in Cleveland as disclosed by the auditors' report was undoubtedly a surprise to many municipal ownership advocates, and may serve to restrain the enthusiasm of some who would divert city funds from improvements not otherwise obtainable to municipal lighting equipment which serves no useful economic purpose and which would otherwise be adequately provided by private capital. The paper calls attention to the fact that the city of Memphis employed a

consulting engineer to design a municipal plant, secured authorization for a bond issue to cover its cost and obtained bids from bankers for the purchase of the bonds, at which point in the procedure, approximately coinciding with the publication of the Cleveland auditors' report, the entire project was suddenly abandoned and lighting contracts renewed with private plants.

* * *

Another occurrence about the same time may also have significance. The city of Columbus, Ohio, has for some years operated a municipal plant with a maximum rate for lighting or power reported to be three cents, the same as in Cleveland. On December 18, 1916, the city of Columbus by ordinance increased the rates of its municipal plant to a maximum of five cents net. There has been comparatively little publicity of the affairs of the Columbus plant, but there is no reason to think that its operating results should differ widely from those in the neighboring city of Cleveland. The city officials of Columbus were governed by no more than ordinary good sense in facing the situation in a logical way and raising their rates so that the municipal plant shall not be an excessive burden upon taxpayers generally. In the light of the facts now for the first time available, it is obvious that Cleveland, if it would treat its taxpayers with equal fairness, must in all probability follow the example set by Columbus.

The Excess Profits Tax

The proposed excess profits tax is viewed with concern for two reasons: first, it is odious in itself, and, second, it is a dangerous precedent.

The excess profits tax is part of the emergency tax measure now before Congress. The purpose of this measure is "to defray the increased appropriations for the army and navy and the extension of fortifications." Certainly, at this time, no American will protest against increased military efficiency. Larger revenue is needed, and it will be gladly provided by the American people. The avowed purpose of the emergency tax bill meets with the general approval of tax payers; it is the means that encounters objection.

It is proposed to levy an excess profits tax of eight per cent

upon the net income of corporations and partnerships in excess of eight per cent on the capital, and it is calculated that the yield will be about \$226,000,000. No one will question the fact that the government needs the \$226,000,000, but most self-respecting persons will question the fact that this is the right way to get it. It is claimed by those who have fathered the measure that as the business interests of the country have been responsible for the agitation for preparedness they should be made to pay the cost. The inference is that it is only the people who earn more than eight per cent on their capital that have anything to gain from the maintenance of liberty and order. This of course is absurd. When the business interests called for preparedness they were speaking for the 100,000,000 of our population. Everybody wants liberty and order, but everybody does not want to pay for these blessings. It is shocking to find persons clamoring for the noblest possessions of the human mind—at someone else's expense.

Let the government have all the money it needs to defend our liberties, and let everyone pay his share! That is the way a self-respecting nation would order its affairs. The measure now before Congress puts the ordinary American practically in the position of asking, "After all, is liberty, when reduced to the terms of dollars and cents, worth anything to me?" We are reminded, in fact, of those persons in the city of London who, in 1803, when Pitt was proposing his income tax in order to defend Great Britain against a Napoleonic invasion, said that if the income tax were necessary to save the country, it would be better to have the country go. Perhaps we should add that Pitt's measure taxed all incomes down to \$300. We are also reminded of a gathering in Great Britain sometime after the outbreak of the present war, at which one representative expressed the opinion that people of his class would be as well off under German rule as under British,—he was not disposed to go to much expense or money or effort to maintain British liberties.

Things that cost nothing are usually worth nothing. A person who possesses liberty without any cost to himself is not likely to prize it very highly or use it very well. Perhaps that may explain why every nation has so many political ills.

It is, however, the precedent which the proposed measure will, if it becomes a law, establish that should most excite apprehension. The inequalities of the present income tax are a

bad thing in themselves, but they are a very much worse thing in what they portend. Taxation has become a sort of "big stick." Originally it was for the purpose of raising revenue to carry on the government; today, it is largely for the purpose of enabling the government to regulate private industry. It is always a good thing to try to figure the end from the beginning. While no one can foretell exactly what the end will be if the excess income tax measure becomes a law, it is easy to see certain lines along which it will be likely to operate.

Some persons have always had a fear that when the public had disciplined the public utility companies to the fullest extent, it would turn its attention to private corporations and co-partnerships. It has framed practically half a hundred systems of law for the purpose of regulating public utility companies, and has constituted as many commissions to see that the laws are executed. The laws and the commissions have busied themselves in telling the public utilities what kind of service they should render and what price they should charge for it, and the demand has been for a steady increase in the character of the service and a steady decrease in the price. It has always been a question in the minds of some persons how long it would be before private corporations and co-partnerships were subjected to the same process.

It looks as if we had reached the beginning of the end. Why is it not a logical step? A street car ride, or an electric lamp, or a telephone message, is not more of a necessity than a loaf of bread, or a suit of clothes, or a pair of shoes. If the public wants a cheap ride, or a cheap light, or a cheap message, why should it not also want a cheap loaf, or a cheap coat, or a cheap shoe? In the past it has been said that it could not consistently ask for the latter, because they were not produced under monopolistic conditions. It always takes the human mind a little while to adjust itself to new ideas, and it has taken it some time to adjust itself to the idea that the people who make bread and clothes and shoes could as properly be disciplined as the people who run railroads and lighting companies and telephone companies.

An excess profits tax will be a good start. It will take us some time to work the thing out to a logical result, but it looks as if we should get there eventually. The proposed law will allow private companies and co-partnerships to earn at least eight per cent, and will then turn over part of the excess, but not the

whole, to the government, that is, to "the public." This willingness to make haste slowly is admirable. Someone, however, has said that this world gets on from precedent to precedent, and here we have a precedent for new developments. By and by, instead of taking eight per cent of the excess, the government will be able to take sixteen per cent, and subsequently twenty-four per cent, and so on until the whole of the excess is consumed. It will be seen that the doctrine of "a fair return on a fair valuation" has thus been extended from public utilities to private utilities; and if not, why not?

It will be said, of course, that the proposed law will be merely an emergency law and will be repealed before very long. This hope is creditable to the heart, but not to the head. We don't do things that way in this country, nor, indeed, in any country. If one doubts that, let him study the income tax in Great Britain. This tax was first established something more than a hundred years ago, when the British nation was in a situation quite similar to the one in which it now finds itself. It was detestable to everybody, and it was employed merely as an exigency measure to be repealed as soon as possible. There has always, however, been good reason for perpetuating it, though the greatest of British statesmen have tried time and again to get rid of it. Mr. Gladstone, one of the greatest finance ministers that Great Britain has ever had, as far back as 1853 demonstrated the injustice of averaging incomes, or of attempting to tax one species of income more lightly or more heavily than another. In 1860, Disraeli said that the income tax "is unfortunately still alive; nay, more, it is a child which has greatly grown." And in 1861, Gladstone said that he would like very much to be the man who would put an end to it. "I think," he declared, "it would be a most enviable lot of any Chancellor of the Exchequer." He looked, he added, for the coming of some Chancellor of the Exchequer to whom it might be said:—

"He took the tax away

And built himself an everlasting name"

That fortunate being has not yet arrived.

If the excess profits tax could be regarded as a strictly war measure, we might hope for its repeal some day. But was it incorporated in the pending law as strictly a war measure? We might suppose that it was inserted covertly for another purpose; but it is not necessary to do so, because the country has been frankly told that the intention was to make one part of the people pay the bills of another part. This open acknowl-

edgment of the end in mind diminishes one's hope of an early repeal. If \$226,000,000 can be raised from a tax on corporation and co-partnership profits in excess of eight per cent, what easier way of raising money for government expenditure could one desire? Think of the number of towns in this country with populations of 300 to 900 that ardently desire post office buildings costing \$50,000 to \$100,000 each! Think of the number of creeks that need to be dredged and otherwise improved! Think of the number of people to whom Uncle Sam owes a living! How better could these and a hundred other demands be satisfied than by an excess profits tax?

And think, too, of the enormous number of people who could find employment in helping Uncle Sam carry out an excess profits tax law. Not much has yet been said about this aspect of the measure, but it is, perhaps, the most important of all. Who is going to say whether a corporation or a co-partnership has earned anything over eight per cent or not? The government has got to find the excess before it can tax it, and that is quite likely to be a very interesting feat. In our mind's eye we can see new commissions created to undertake this work, with a countless army of experts and accountants to help them in accomplishing it. What better means could be devised for solving the question of the high cost of living? In the first place, it will be possible to provide a good many incomes out of which to pay the high cost of living; and in the second place, it will be possible (for a time at least) arbitrarily to cut down the cost of living. Of course, this makes no allowance for economic law, but it makes about as much allowance as has been made in the case of public regulation of public utilities.

But, after all, is it worth it? In 1759 Franklin said, "They that give up essential liberty to obtain a little temporary safety, deserve neither liberty nor safety." Individual liberty is threatened in America today. The initiative of the individual has already been greatly impaired, but is nothing in comparison with the impairment to which it is in danger of being subjected in the future. The people of this country may well ask, What shall it profit a man if he gain the whole world and lose his own soul? That is the danger that is staring us in the face. A great exigency, leaving us little time to collect our wits, may keep us from seeing the end, but the end is there all the same. The liberty of the individual has been the ideal of the American people for nearly three centuries. It was what brought our fathers to these shores; it was what made them throw the tea

overboard in Boston Harbor; it was what prompted them to establish and develop our public schools. From the day the Pilgrims landed on Plymouth Rock, it has animated our whole political life. We now propose to sell our birthright for a mess of pottage. What has cost three centuries of arduous endeavor is now in danger of becoming a dream of the past. The state and not the individual is becoming our ideal. But what is the state? Is it wholly quantitative, or is it in the least qualitative? Do brains, and self-reliance, and public spirit, and honest endeavor still count for anything? Or are mere numbers all there is to it?

Patriotism, Preparedness and Prudence

For thirty months this nation has held itself aloof from the European struggle. It has done nothing consciously to transgress the rights of any of the belligerents. Its action has been governed strictly by the principles of international law, to which all the parties of the present war have in the past sworn allegiance. And yet today its ports are practically blockaded, its rights upon the high seas are violated, and the lives of its people are in danger. Manifestly, such a situation cannot be tolerated. Acquiescence in such a state of affairs would not only lower our national self respect, but also our standing among the nations, not only for the present but for the future as well.

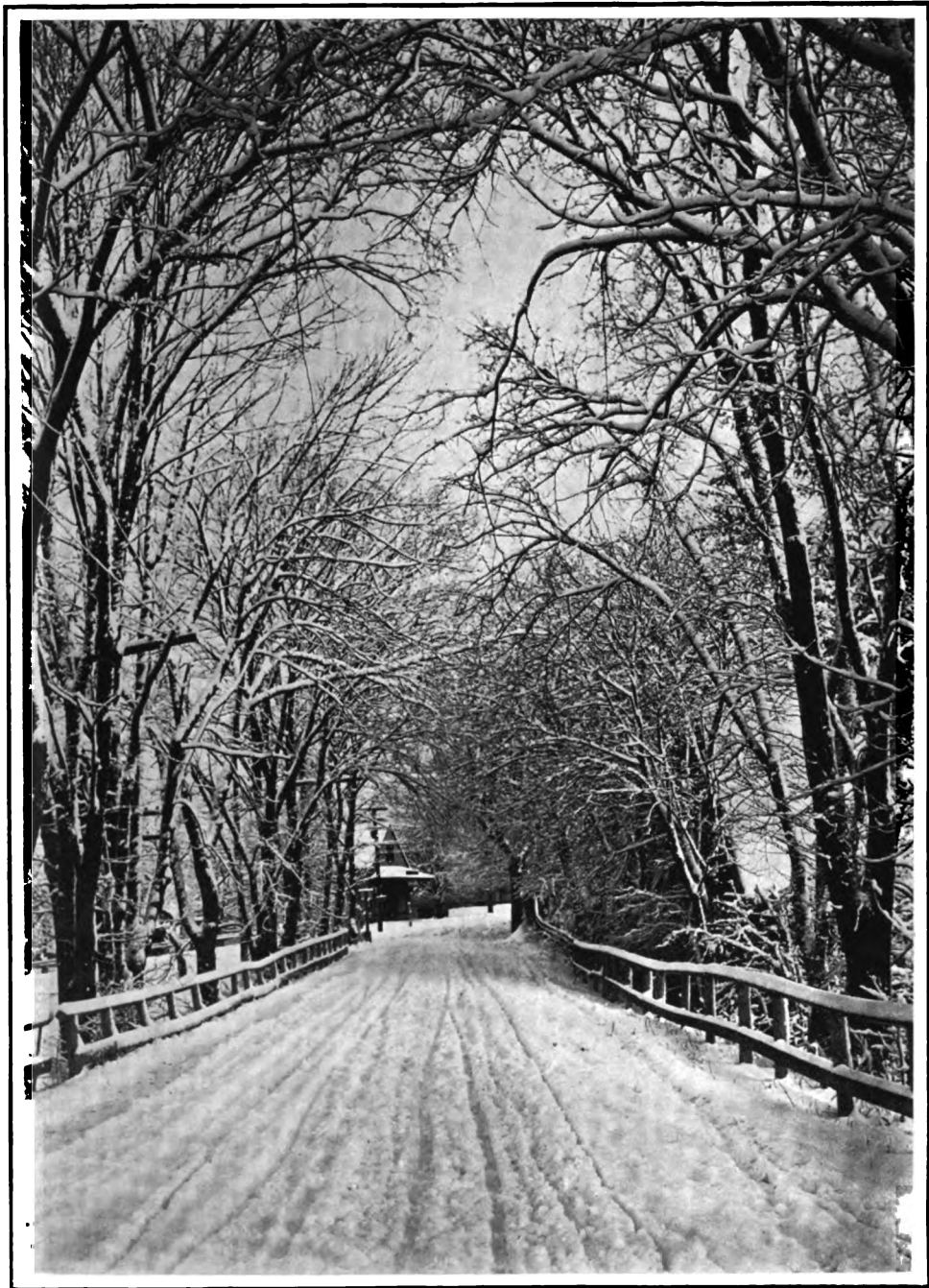
The time has come for us to act. An appeal has been made to our patriotism, which few, we think, will be able to withstand. We are a peaceful people, intent only upon our own affairs, with no desire to meddle in the affairs of others. We cannot, however, allow others to meddle in our affairs. An old Chinese saying runs "The son of Han is not a man of war." That applies with equal force to us. War is both abhorrent and ridiculous; entirely out of place in such a world as we all had fondly hoped ours had become. Necessity, however, knows no law. Peace is to be desired above everything else, but sometimes it is necessary to secure peace by other than peaceful methods. Some persons have been so foolish as to suppose that a nation absorbed in commerce must necessarily be pusillanimous. History disproves this. No nation was ever more commercial than the Dutch in the sixteenth and seventeenth centuries, yet no nation has ever been more heroic than the Dutch were during that period. If it is necessary we shall, we trust, be able to afford the world as signal an instance. No people are more patriotic than the American people. None have more

cause to be. Liberty, the most priceless of all gifts, has characterized America above all other nations. We shall allow no one to dispossess us of it in the slightest degree without a vigorous struggle. Every American can be counted upon as agreeing to that.

As faith without works is dead, so patriotism without preparedness is ineffective. We are not prepared for war at this time. In view of what confronts us today we must prepare with all possible dispatch. Though we may not be called upon to fight, we should put ourselves in a position to fight. We should supply ourselves with all the essentials of war. The first essentials are munitions and engineering skill. On another page, we print a letter from a correspondent who advocates the purchase by the government of great amounts of nitrates. Our correspondent might have gone farther. We suggest the following list of materials to be acquired immediately, and held for the arts if not needed for war, and in a rough way indicate about what, based upon present quotations, they should cost.

500,000 tons Sulphur	@ \$ 22.00	= \$ 11,000,000
500,000 tons Pyrites	@ 15.00	= 7,500,000
2,000,000 tons Sodium Nitrate	@ 50.00	= 100,000,000
100,000,000 lbs. Glycerine	@ .40	= 40,000,000
500,000 tons Cotton	@ 360.00	= 180,000,000
1,000,000 lbs. Phenol	@ .40	= 400,000
1,000,000 lbs. Toluol	@ .40	= 400,000
1,000,000 tons Oil of Vitriol	@ 8.00	= 8,000,000
500,000 tons Nitric Acid	@ 60.00	= 3,000,000
1,000,000 tons Steel Billets	@ 40.00	= 40,000,000
1,000,000 gals. Gasoline	@ .20	= 20,000,000
100,000,000 lbs. Copper	@ .30	= 30,000,000
100,000,000 lbs. Zinc	@ .10	= 10,000,000
600,000,000 lbs. Lead	@ .07	= 42,000,000
		<u>\$492,300,000</u>

There is no reason why we should not do what we have to do in this matter with the greatest prudence. The correspondent above referred to advocates purchasing nitrates and issuing government notes against them with the quality of legal tender, redeemable at the option of the government in nitrates or gold. This is an interesting suggestion which we are glad to submit to the economic judgment of the country. Our correspondent's idea is that such commodities, though acquired for war purposes, are equally necessary in the peaceful arts, and are, therefore, perfectly good security for currency issues.



ON THE STOUGHTON TURNPIKE

THE TOLL ROAD—OUR FIRST PUBLIC UTILITY

BY F. J. WOOD

In earliest English law we find special obligations imposed on those engaged in occupations on which the welfare of the public depended. The surgeon, from the scarcity of men qualified for that position, had to serve a large number and enjoyed a monopoly in his territory. The consequences should he discriminate against any individual and refuse to attend him would be far too serious, and hence he was obliged by law to serve alike all who stood ready to pay him. In similar relations to the public stood the tailor, smith, victualler, baker, inn-keeper, miller, carrier, ferryman, and wharfinger. By competition and increased numbers engaged in the occupations, most of the above trades have been removed from the class of public service, but the obligation still rests upon the inn-keeper; the carrier has been succeeded by the railroads, and the ferryman by the publicly maintained bridges.

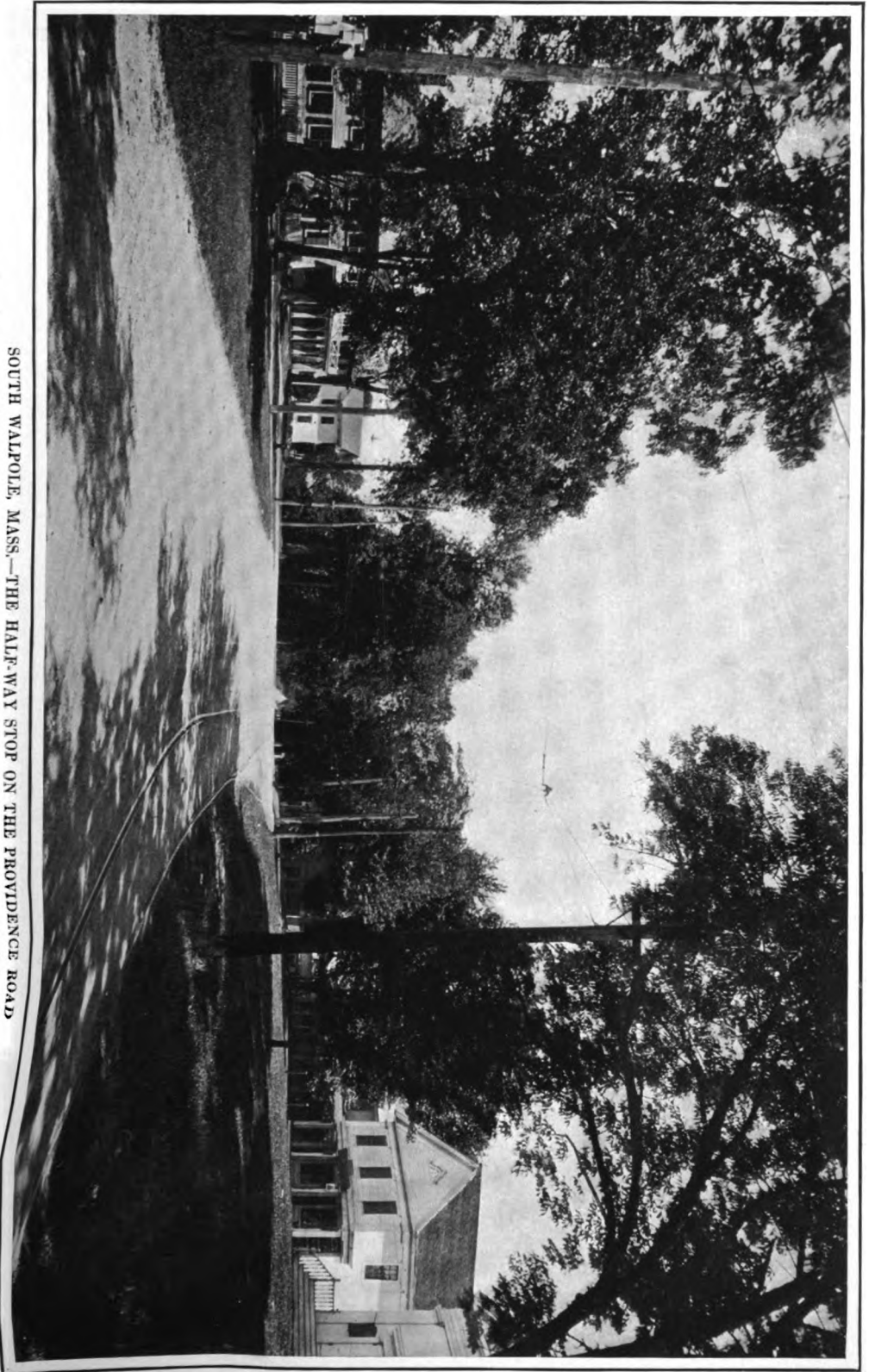
Following the adjustment of our commercial affairs after the Revolutionary War, an insistent demand for better and far more extensive transportation facilities arose. Down to that time very little travel in carriages or wagons had been known, and the roads were little more than paths, from which the trees had been cleared and on which the original turf had been worn off by the passing feet. With the growth of manufacturing which set in at the opening of the nineteenth century the need became imperative for roads capable of carrying the heavy teams of raw and finished material, to the mills and to the markets. But who was to pay for such improvements?

The towns, on which the burden would fall, were too poor to stand the necessary expense. All of them were impoverished by their contributions of men, money, and supplies, in the war for independence, and by the struggle of the next decade to maintain themselves against the commercial warfare waged by English merchants. The states were in no better condition and it was simply out of the question for the public funds to provide for the increased transportation. In this dilemma relief was found in the willingness of private citizens to invest their funds and energies in the construction of the roads, provided the same could be done as a conservative business investment. Therein lay the difficulty.

As individuals they possessed no power by which they could lay their roads in the best locations; they could not take over or improve any portion of an old road, or even cross one. Their collection of tolls, if they built a road, could not be enforced, and, what was of more vital importance to them, any one of them would be personally liable for injuries or damages consequent upon any defect in the road, or action of their servants. Such undertakings required combinations of capital in excess of anything then known in private affairs, and a permanent form of organization was necessary for the maintenance of such roads. Out of these difficulties grew the turnpike corporations, organized to construct the roads and to derive revenue from the collection of tolls.

The organization of corporations for business purposes began about this time, having been unknown previous to the Revolution, and by far the larger part of the first twenty years of such productions were for the purposes of turnpikes and toll bridges. In old English law a corporation could only be formed by a charter from the Crown, or by a special act of Parliament. Upon the severance of the ties to the mother country such powers of the monarch ceased and they were never bestowed upon any individual officer of the new government. General laws by which corporations could be organized by complying with certain requirements, and without a dispensation from some supreme authority, originated in New York in 1811, at which time laws for the formation of manufacturing companies were enacted, but it was many years before such privileges were extended to corporations for other purposes. So, at the opening of the turnpike era, there was but one power, the legislature or assembly of the state, which could grant a charter for a corporation; and as long as turnpikes were projected, this condition continued in New England.

The charters for turnpike purposes thus granted bore a general resemblance to each other; in fact many paragraphs were exactly copied, and in but few were special features contained. To avoid the weary repetition involved in the duplicate recital of routine sections of turnpike charters, the Massachusetts legislature, on March 16, 1805, enacted them all into a general law, and provided that such should be the rights, powers, and privileges, of all turnpike corporations thereafter created. By this procedure Massachusetts anticipated by forty years the famous "Companies Clauses Consolidation Act" of



SOUTH WALPOLE, MASS.—THE HALF-WAY STOP ON THE PROVIDENCE ROAD

Out of the intense rivalry between these two taverns grew an arrangement whereby all stages pulled up on the right-hand side; thus giving all Boston-bound passengers their dinner in one house, while those going to Providence were refreshed in the one opposite. Of these, Polly's Tavern enjoyed a wide reputation for the excellent dinners served.

Great Britain. The other New England states, however, continued the long-drawn-out repetition with each company formed, although Vermont, in 1808, formed eight corporations in one act, with the routine sections enacted once for all of them. So throughout the turnpike history of New England, we find a special act of a legislature creating each corporation.

As the turnpike corporations relieved the local governments of their obligations to maintain certain highways, it was but proper that some of the governmental powers should be conferred upon them. Hence they were granted the rights under the principal of eminent domain, that an obstinate land owner could not, by refusing to sell, block the great enterprise of such value to the public. They were further allowed to take over and incorporate into their roads, various sections of what had long been public highways, freely open to all classes of travel but which, under the control of the turnpike corporation, became subject to the interruption of a gate and the demand for toll. Although the occasion for the last privilege was provided by the neglect or inability of the communities to keep the roads in proper repair, and the companies in consideration were bound to maintain properly such sections of road, the diversion from public to private control caused much hostility on the part of the local population, was the cause of much litigation, and several times of acts of violence. Many acts of the legislatures have been found, usually in behalf of a special corporation, providing penalties for damages done to the road or its gates. A popular form of road was the "Shunpike," which was a short section leaving the turnpike on one side of a toll gate and joining it again on the other. Special and general laws were enacted to discourage such enterprises, and penalties were provided for evasions of toll by other means.

What now seem pretty severe restrictions were also imposed upon the corporations. They were limited strictly to the building and maintaining of a road, and were not allowed to do any other act or thing. The Rhode Island acts generally permitted the companies to acquire, and dispose of, a reasonable amount of land, but in the other New England states the acquisition of a few acres that the keeper of a remote toll house might cultivate a garden, was only allowed by special legislative act. When the Torrington Turnpike was laid out, in Connecticut, it entered the road of the Talcott Mountain Turnpike Company at a flat angle, and the locating committee saw fit to

include the little triangle in the lay-out of the road. But the Assembly of 1805 declared that the road was only authorized to be four rods in width; that the taking of such additional land was illegal; and that the land was still owned by the party from whom the committee had sought to take it.

Rates of toll were fixed in the charter and the number of gates which the company was to be allowed to erect was also specified. The location of the gates was determined by the committee which was entrusted with the location of the road, and the gates once located by such committee could only be moved by legislative consent. The location of the road was not entrusted to the judgment of those who were investing their money, and who could best be depended upon to act conscientiously, but was delegated to a committee appointed either by the legislature or by the judge of the county court. Since the turnpike was to be for the public service, the representatives of the public fixed its location, as had previously been done with the laying out of public roads.

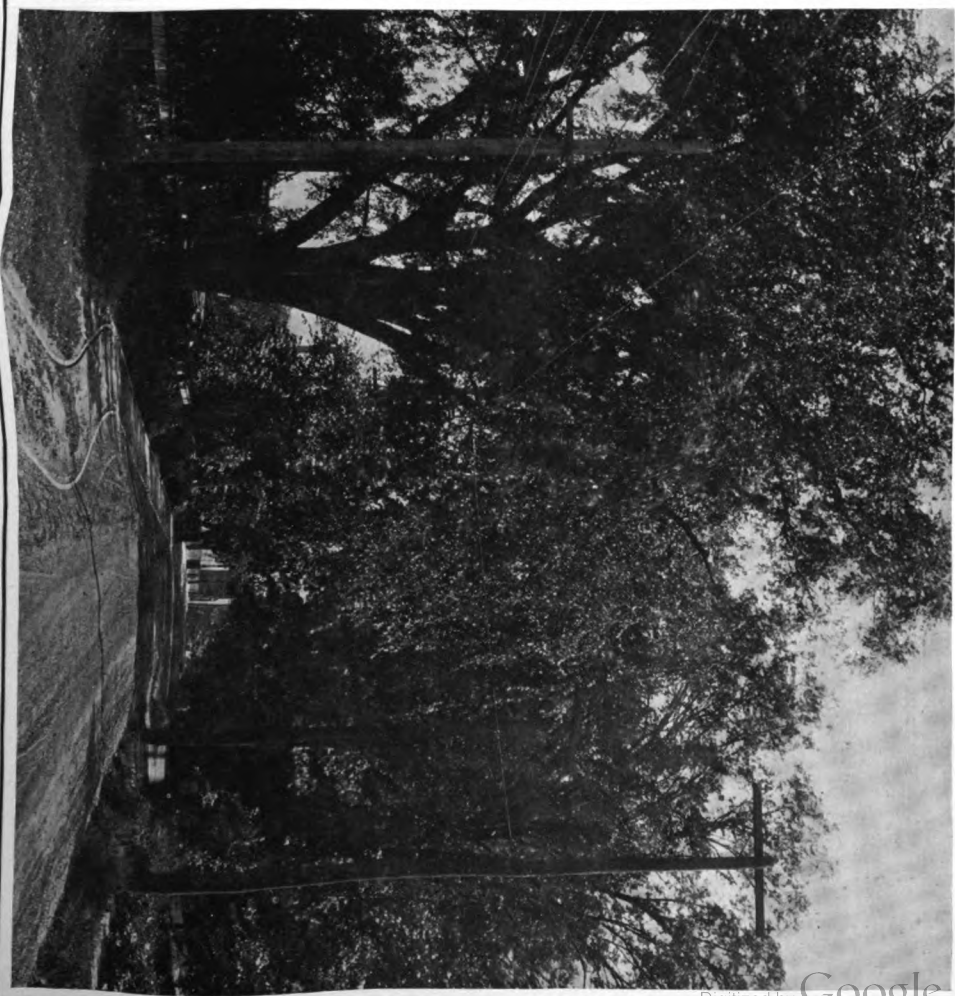
Corporations formed in the northern New England states did not have a charter provision fixing the amount of their capital stock. As the company was to be allowed to do only certain definite things, there seemed to be no need of limiting the amount of money which it might raise, and considering the difficulty experienced by nearly all the projects in getting financed, there was no need. The later Vermont companies were chartered with a nominal capital which they were at liberty to increase to "any necessary amount."

There were two forms of turnpike franchises in New England. One form, that most commonly found in Connecticut, was that in which an existing old road, badly in need of repairs and beyond the resources of the local authorities, was declared no longer a public highway and was presented to a turnpike corporation, organized for the purpose of putting it in good order and thereafter maintaining it so. In the early Rhode Island corporations we find the same method, notably in the case of the first franchise granted there. In the petition for a charter for that company it was recited that the petitioners had raised a certain sum which they would expend in specified repairs if they might have a designated highway to be by them maintained as a turnpike.

The second form of franchise was that in which the intention was to have an entirely new road built, cutting across fields



MILESTONE ON THE ANDOVER AND MEDFORD TURNPIKE



NEAR EAST WALPOLE, MASS., ON THE WAY TO PROVIDENCE

and through forests hitherto untouched, and shortening the distance between the terminal points. Such a road, naturally, often ran into some old road and not infrequently followed the course of one for a little way, but it was seldom that a deflection to one side was made to secure such a result.

The Connecticut practice in providing for such a road was for the Assembly to pass an act describing in more or less detail the location of the proposed road, to declare that a road was thereby laid out along the described route, and to decree that the same should be a public highway. Then a corporation was chartered for the purpose of building that road, and in consideration of doing so was allowed to operate the road as a turnpike. Under this method the towns were required to acquire and pay for the land, and to build the bridges, the corporation merely building the road itself, unless a bridge of considerable size was necessary, in which case the franchise might require the corporation to build it. Naturally such procedure, putting heavy burdens on the towns which they were not willing to assume, for conveniences which they themselves had not desired, caused much dissatisfaction, and in 1803 New Milford, at a town meeting, appointed a committee to confer with other towns in an effort to have the granting of such turnpike franchises stopped. But the effort did not succeed and many more such turnpikes were established. It can easily be conceived that, after a lapse of several years, some confusion arose as to the responsibility for different bridges, from which issued the section, found in the revised statutes of 1835, in which it is provided that, unless a bridge in the line of a turnpike is distinctly specified in the franchise as one which the town is to maintain, the responsibility therefor is on the turnpike corporation.

In most of the early Massachusetts charters for roads of this class, it was directed that the turnpike should be built in as straight a line as possible, and this was nearly always done with unfortunate results, as the resultant location led up and down hill regardless of grades, and, disregarding centres of population, usually rendered the road of little practical use. It does not appear, however, that this condition was imposed without the consent of the persons incorporated, for the one idea pervading the minds of turnpike promoters, seemed to be to build in a straight line whenever possible. In fact the crookedness of existing roads was the chief argument used by peti-

tioners for turnpike franchises, and hence they were more or less bound to build straight roads.

A quaint old book, published in 1806 and entitled "Rural Economy," contains some ambitious sections on turnpikes. Of their layout it says:—

"The shortest line is a straight one and can not be rivalled, and as such merits the first consideration."

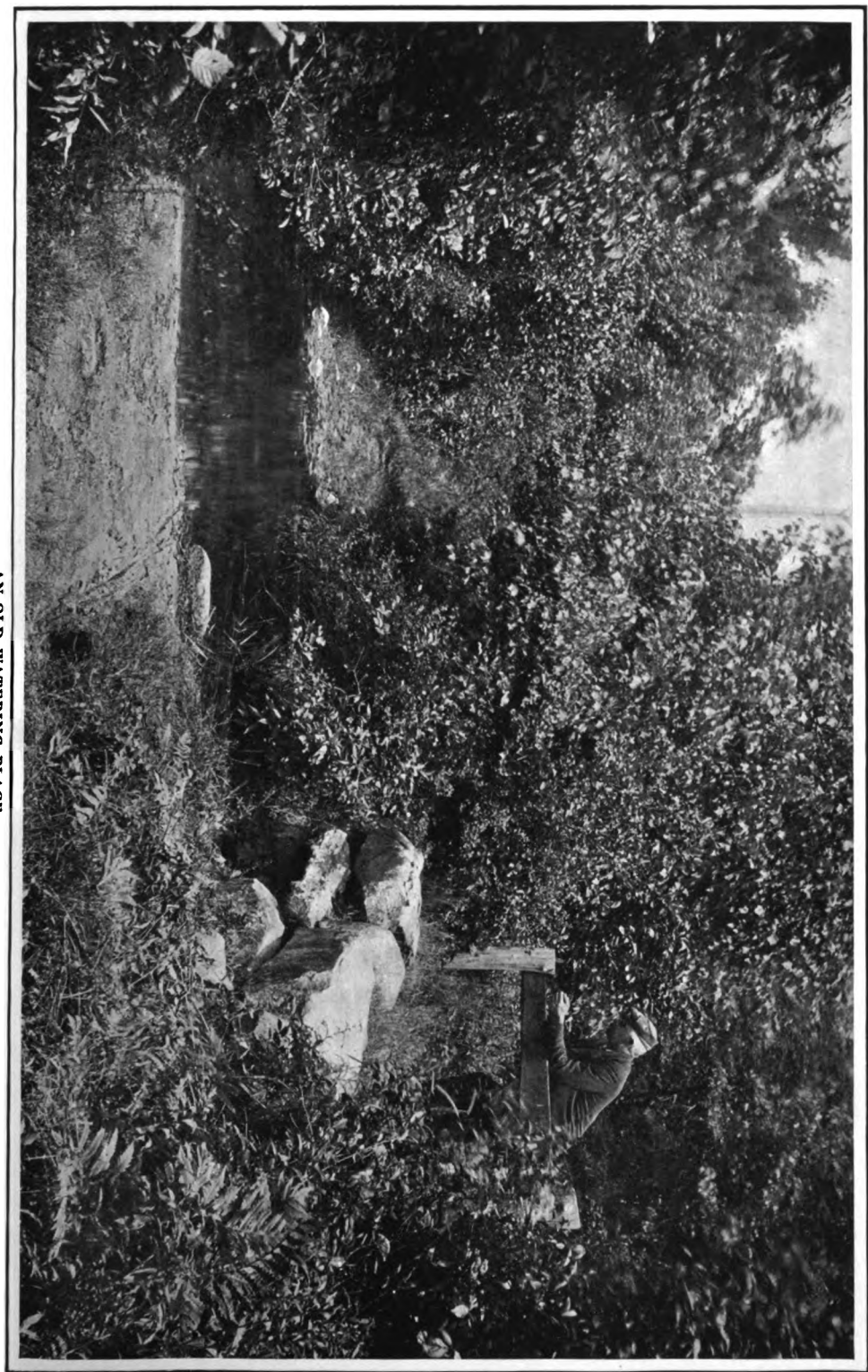
The author advises laying out the route on the ground by that principle, and that it be abandoned only in the face of "innumerable obstructions." The maximum angle of ascent should be exceeded if thereby the straight line can be maintained.

Nearly all the Massachusetts turnpikes were of this latter class, of which there is no more striking illustration than the Newburyport Turnpike.

Only two types of road were ever specified in the New England charters. There was the "turnpike-road," with no attempt to describe its character or quality, and the "plank road." In the former case the corporation was left free to choose whether it would build a high-grade macadam road, or just clear away the trees and sod and make only a common dirt road. Where plank road franchises were granted some very simple specifications were generally included in the charter, requiring that the "track of the road" should be laid with plank "or some other hard material," and that it should present a smooth and even surface. Only about a half dozen plank roads were ever built in New England, and those were in Vermont and Connecticut.

Governmental supervision was early exercised in Vermont and in Connecticut. In the former state laws were enacted as far back as 1806, providing for the appointment of Turnpike Inspectors in each county. The county court, annually in December, appointed "three judicious freeholders" to that office. Before taking office each appointee was required to make oath that he was disinterested as far as turnpike management was concerned. If he later became the fortunate owner of turnpike stock, his tenure of office automatically ceased. It was the duty of such inspectors, on the petition of three freeholders, to make an examination of the turnpike of which complaint had been made and to order such repairs as they found necessary. If the corporation did not comply with the order, the inspectors were empowered to throw the gate or gates open for the free passage of all travellers, and keep them so until the re-

AN OLD WATERING PLACE



quired repairs had been made. An appeal to the court was allowed for the protection of the corporation.

In Connecticut under a law originating in 1808, two commissioners were appointed, by the Senate, for each turnpike in the state. These commissioners were required to inspect the road under their supervision once in each year at least, and were empowered to order any repairs which they found were needed. They could open the gate at once and keep it open until their orders had been obeyed. They were authorized to set a limit within which the repairs must be completed and, if the company exceeded that limit by more than thirty days, the General Assembly might repeal its charter. The books of the corporation had to be exhibited to the commissioners upon demand, and from them the commissioners made up a financial report to submit to the state. For their services the commissioners were allowed a salary of two dollars per diem paid by the turnpike corporation.

In Massachusetts a provision by which a justice of the court of common pleas could order repairs and enforce his order appears in 1805, and in 1840 such powers were conferred upon the county commissioners. All Massachusetts companies were required, by a provision in their charters, to make an annual return to the secretary of state of the business done, but no penalty was provided and consequently some corporations obeyed and some ignored the requirement. The revised statutes of 1860 contained this section, but even then the law had "no teeth in it." In all the states the turnpikes originally were liable to indictment for being in bad order, which rendered the corporation liable to a fine, the same as in the case of the towns. But that did not seem to be sufficient and power to open the gates was found necessary to compel the proper repair of the roads.

Rosy hopes were entertained in all the New England states of the financial success of turnpikes. No limit to the life of the franchises was thought necessary other than the provision that, when the investors had been repaid their original investment plus interest at the rate of twelve per cent, the road should revert to the public. With the possible exception of the turnpike between Providence and Pawtucket, not one New England road ever came within gunshot of realizing such expectations, the best Massachusetts road, that of the Salem Turnpike Corporation, reporting an average net earning of 3.1

per cent over a period of sixty years. In consequence Connecticut found herself, in 1835, with a number of turnpikes within her borders which seemed to be perpetually chartered, as no reservation had been made by which the Assembly could repeal the franchises. So an act was passed in that year which provided that all gates on turnpikes then erected might remain where they were, with the consent of the two commissioners for the turnpike and one of the judges of the county. Section Two allowed the legality of gates which might have been moved without proper authority and authorized the collection of accounts which had been run at such gates. Section Four required all companies which availed themselves of this act to vote such acceptance in a regular meeting and file a certified copy of the record at the state house. And the charters of all corporations which did accept the act became subject to repeal by the Assembly.

Mention has already been made of the charter provision that a road should revert to the public ownership when the investment plus twelve per cent interest had been earned. This appears in the acts of every state and it may be interesting to consider briefly how far short of realizing such hopes the actual performances were. There is some reason for inferring that it was expected that the life of a road, under such terms, would be about twenty years, and to fulfill that expectation a road would have to yield net earnings of twelve per cent for interest and five per cent for a sinking fund, or seventeen per cent in all. We will consider the two best roads in Massachusetts, the Salem Turnpike, now Broadway in Chelsea and Revere, and the Dorchester Turnpike, now Dorchester avenue through South Boston and Dorchester, taking the best single year's business done on each road, which stands in a pronounced peak on the plotted charts. The best year on the Salem was 1835, when the net earnings of the road amounted to \$12,330, or about 6.8 per cent of the cost of construction. The Dorchester's biggest year's work was done in 1838, when its net earnings were \$4,005, or about 9.2 per cent of the cost. So it may safely be said that in only one year and on only one road did the earnings yield half enough to meet the expectations. And in nearly every case the road was finally given up at an almost total loss.

The railroads must not be blamed for the ultimate failure of the turnpikes. While it is true that they killed the surviving roads, it is also true that by far the larger part of the turnpikes

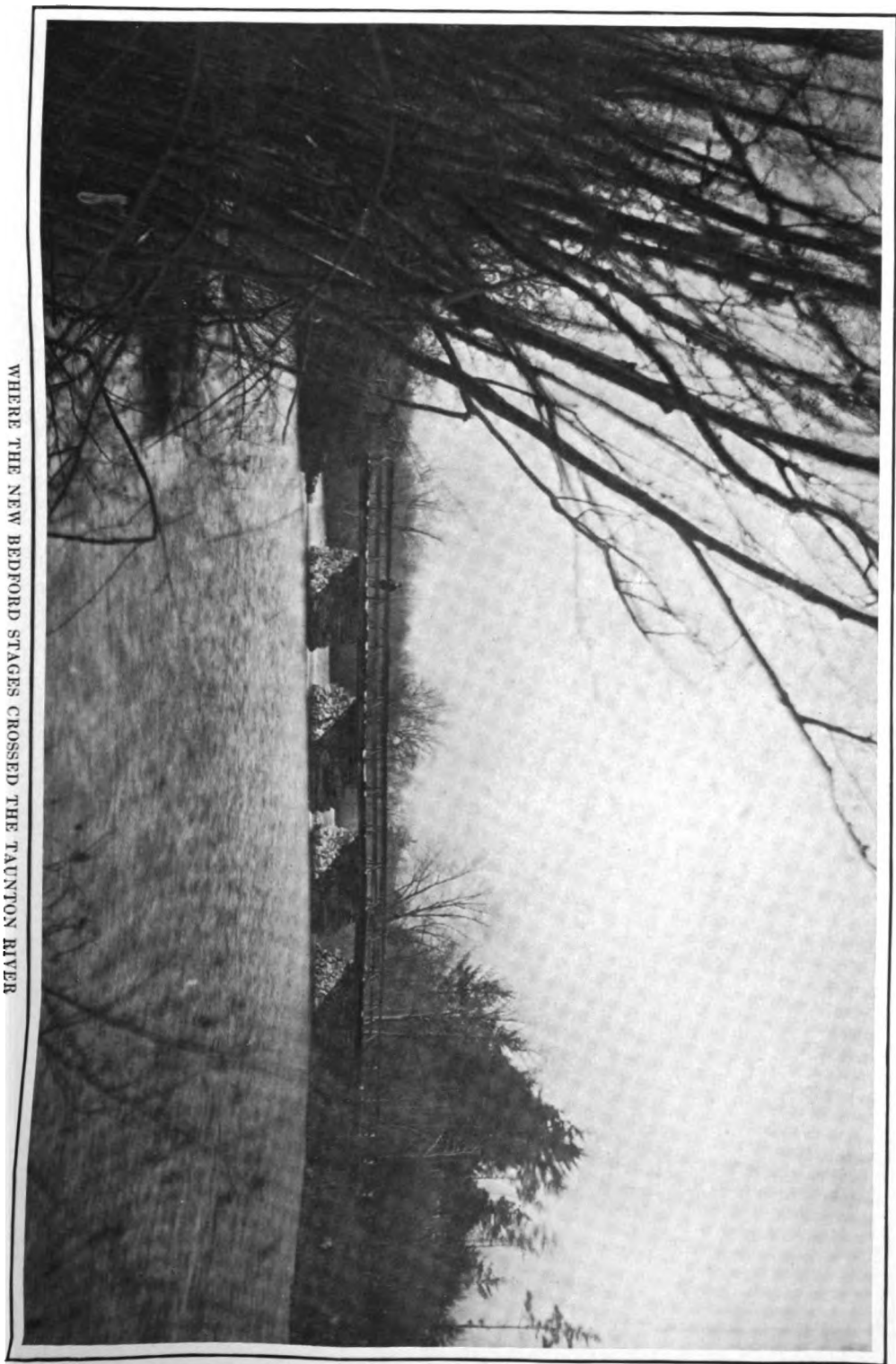


THE UNION TURNPIKE IN HARVARD
Abandoned a Century Ago



A VISTA ON THE CAMBRIDGE AND CONCORD TURNPIKE

WHERE THE NEW BEDFORD STAGES CROSSED THE TAUNTON RIVER



had given up the struggle before that competition arrived. It was simply a case of not enough demand to make the investment pay.

A great difference naturally existed in the earning powers of roads in different sections, and it would manifestly have been unfair to allow the same rates of toll in the Berkshires, on a road built under engineering difficulties and through sparsely settled districts, as were granted to a route tributary to Boston and connecting several prosperous communities. Hence a variety of authorized charges can be found by detailed search but a fair average can be given. The Massachusetts custom generally was to allow the erection of gates at intervals of about ten miles; and in the eastern part of the state the traveller would be apt to find the following displayed on a sign board at each gate "fairly and legibly written thereon in large or capital letters":—

Rates of Toll

For every coach, phaeton, chariot, or other four-wheeled carriage, drawn by two horses	25 cts.
And if drawn by more than two horses, for each additional horse	4
For every curricule	17
For every cart, wagon, sled, or sleigh, drawn by two oxen or horses	10
And, if drawn by more than two, for each horse or ox in addition	3
For every chaise, chair, or other carriage drawn by one horse	10
For every sled or sleigh drawn by one horse	6
For every man and horse	4
For all oxen, horses, mules, and neat cattle, led or driven, besides those in teams and carriages, each	1
For all sheep and swine, by the dozen	3

Adjacent to the New York line, in the town of Hancock, would have been found a sign board on which the rates would have run from twenty-five to fifty per cent higher than those just given. But the usual manner of giving relief to companies in receipt of insufficient tolls was not to allow an increased rate, but to authorize additional gates, thus giving extra collections of the same amount.

For local reasons a company was often allowed to establish

two gates within the limits of one, collecting one-half the allowed rate at each. Such were significantly known as "half gates."

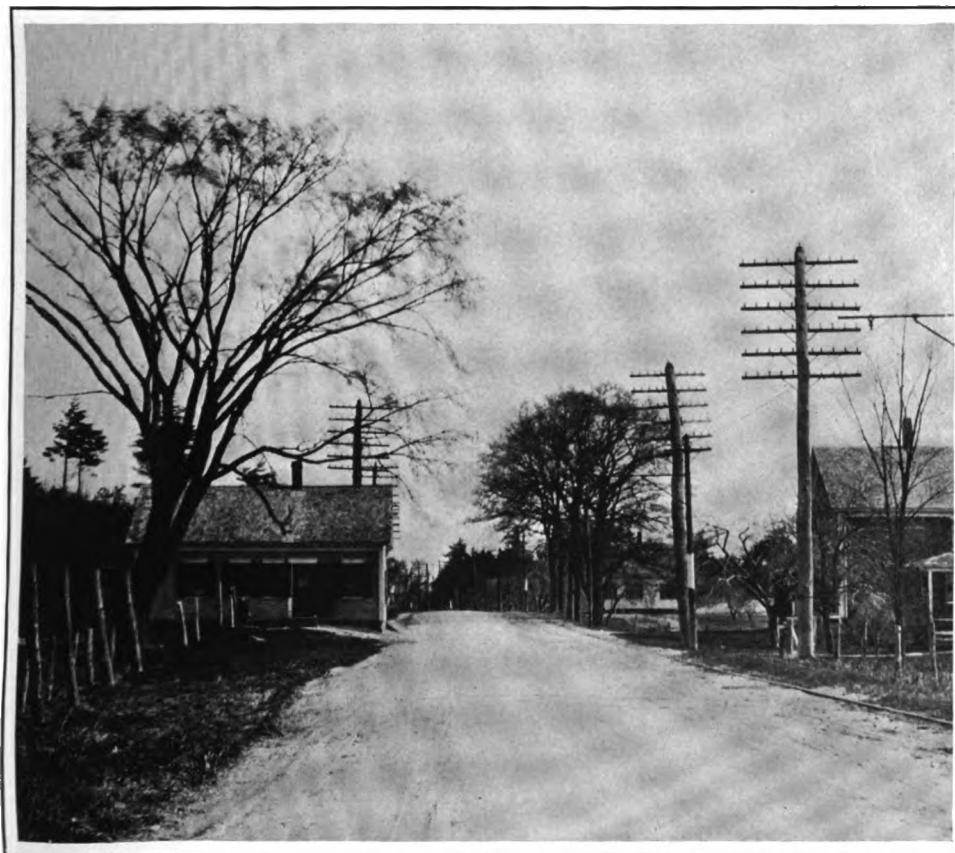
Under authority of these turnpike charters roads were built all over New England, except in Maine, where few obtained a footing. Every town of any importance, and many of none, had its turnpike connections, often radiating in all directions, while the routes leading from the more populous centres were frequently paralleled and but a short distance apart. The common form of turnpike was merely a dirt road, costing from six hundred to a thousand dollars a mile, and a few had macadam surfaces.

The turnpike era began in New England in 1792, when the first turnpike in America was established between New London and Norwich, and it can be said to have ended about 1850, although several scattered roads continued in business for many years longer. In fact there are two still collecting tolls in the White Mountains, and the Peru Turnpike in Vermont only ceased within a year.

Coming as they did, before the inception of railroads and when the demands for easy transportation were imperative, those old roads played a most important part in the early development of our country, and the story of the turnpikes and the old Conestoga wagons, in which the freight was hauled, is deserving of more recognition than history has accorded to it.



A SNOW SCENE IN WRENTHAM, MASS., ON THE PROVIDENCE ROAD



AN OLD TOLL HOUSE ON THE TAUNTON AND SOUTH BOSTON TURNPIKE
This was allowed to remain through state highway improvement and was only removed within a few years.



UNION TURNPIKE IN LANCASTER



NEW BEDFORD AND BRIDGEWATER TURNPIKE IN BRIDGEWATER

THE TRUTH ABOUT THE CLEVELAND MUNICIPAL ELECTRIC PLANT

BY L. R. NASH

About a year ago the writer had opportunity during a visit in Cleveland, Ohio, to make a brief study of the municipal lighting situation. The new power station and other parts of the system were examined and an effort made to determine the financial condition of the enterprise after nearly a year and one-half of operation on its enlarged scale. It was quickly seen that obvious peculiarities in accounting methods employed by the plant made any official figures of little value for analytical purposes. An attempt was made to translate existing published figures into a form consistent with standard accounting, and while only rough approximations were possible they seemed to indicate that the plant was far from being as profitable as was claimed by its management.

About this time (December 29, 1915) the city council of Cleveland decided to take cognizance of certain extended criticism of the published financial statements of its municipal plant and made a contract with a Cleveland firm of certified public accountants, Messrs. Nau, Rusk & Swearingen, to examine the books and records of the electric plant and its predecessors, to determine in what respects, if any, the books were being improperly kept, to prepare a statement showing the correct financial condition of the property at January 1, 1915, and at January 1, 1916, and a profit and loss statement accurately reflecting the intervening 1915 operations, and to prescribe for future use suitable accounting procedure in full conformity with the state public utility law.

The report of these accountants has but recently been published, although the letter of transmittal is dated November 16, 1916. The report was very much delayed by the almost hopeless confusion found to exist in a part at least of the accounting records. So far no definite public criticism has been made of the accountants' report. It was made by Cleveland citizens who were well acquainted with local conditions and understood to be not unfriendly toward municipal ownership. Criticism would necessarily be restricted to minor matters because important accounting methods and recommendations embodied in the report are based upon the state utility law.

It is believed that an analysis of the situation as disclosed by this report, together with a brief review of municipal plant history in Cleveland, and a forecast of possible future results of operation will be timely and of interest to students of municipal operations. Certain data which the writer collected at the time of his original investigation, and which are embodied herein, have not been brought up to date, but rather used directly as applicable to the period covered by the accountants' report.

Early History

The municipal electric light undertaking in the city of Cleveland had its beginning in 1906, when the city annexed the village of South Brooklyn. This village had installed in 1902 a small lighting plant for serving its citizens, issuing therefor bonds to the amount of \$30,000, which were assumed by Cleveland at the time of annexation. The original plant was inefficient and unsatisfactorily located, so that the city of Cleveland promptly proceeded to build a new generating plant adjoining railroad property for more economical fuel supply. No additional bonds were issued for this reconstruction, but the necessary funds were taken from earnings, or appropriated from general funds, principally the latter.

This station had an ultimate capacity of 1500 kilowatts, consisting of two turbine units of 1000 and 500 kilowatts capacity respectively. Upon the completion of the new municipal plant in 1914 the larger turbine unit was removed thereto and the remaining power plant equipment and the real estate were to be sold. This plant ceased operation January 1, 1915, and its customers, numbering about 4900, have since been supplied through transmission lines from the new generating plant. The old distribution system remains in service.

In 1910 the city of Cleveland annexed the village of Collinwood, inheriting therewith another small municipal plant with a generating capacity of 750 kilowatts driven by small non-condensing Corliss engines. This plant was built in 1901, and ceased to generate on June 1, 1915, at which time it was converted into a substation and its old equipment sold. Its customers, numbering about 1600, are now being served from the new plant through transmission lines. Two bond issues of \$18,000 and \$22,000 respectively were taken over with this plant. The former was refunded on January 12, 1915; the second was scheduled for refunding on April 1, 1916, although a con-

siderable part of the bonded property has disappeared. In addition to these bond issues earnings and other funds were used for extensions.

In advance of the completion of the new plant, some small temporary generators were also installed in 1912 in an unused pumping station of the city on Division street, to relieve the over-loaded condition of the Brooklyn plant. The temporary plant was abandoned when the new plant was started and the equipment has been sold. The generators cost \$20,000 and were sold after two years' use for \$2,300.

Much has been said and written with reference to the financial results of operation of the South Brooklyn and Collinwood plants. The city has contended that the South Brooklyn plant at least, in recent years and under efficient management, has been profitable. On the other hand, it is claimed that neither plant has ever earned enough in addition to operating expenses to take care of interest on the money actually spent for construction purposes, to provide for depreciation and to allow for taxes lost from equivalent private companies. That the rates charged by both old plants were no lower than prevailing central station rates is not disputed.

It is apparently not possible to substantiate clearly the claims of either party to this controversy because the early records of both plants are incomplete and confused, and at no time has their accounting conformed to modern standards. It is here assumed that for present purposes it is immaterial whether these plants were successful or not, as their success would have no material bearing upon the outlook for the new and larger municipal lighting undertaking. If they have not been successful, they would but add two unimportant illustrations of the many failures of small municipal plants.

An outline of the history of these plants and a description and forecast of the success of the new plant are contained in two bulletins issued by the municipal lighting department in April, 1915, and September, 1915. The accuracy of the first bulletin was criticised in a pamphlet locally known as the "yellow book," prepared by H. W. Wilson, who was connected with The Cleveland Electric Illuminating Company. The engineering features of the new plant and some broader phases of the municipal lighting proposition were presented by Commissioner Ballard in a paper read before the American Society of Mechanical Engineers at its annual meeting in December, 1914.

New Municipal Plant

In November, 1911, the citizens of Cleveland voted to authorize the issue of \$2,000,000 of bonds for the erection of a large modern central station and the necessary distributing system, to furnish electric power at a rate not exceeding three cents per kilowatt hour. Under this authorization there has been erected on the lake front at East 53d street, an efficient, new plant containing three new turbine generating units of 5000 kilowatts rated capacity each, with a continuous over-load capacity demonstrated to be about 7500 kilowatts, making the total maximum capacity of the station, together with the Brooklyn unit of 23,500 kilowatts.

The construction of this plant was started in 1912 and operation commenced July 20, 1914, all under the immediate supervision of Commissioner Frederick W. Ballard, appointed in January, 1912, to take charge of the work, Mr. A. B. duPont being retained as consulting engineer. The cost of the completed plant is claimed to be but slightly more than \$50 per kilowatt, exclusive of real estate and the old Brooklyn unit moved thereto. These figures are apparently based on a capacity of 20,000 kilowatts, the actual total cost of construction, exclusive of land, being but slightly more than \$1,000,000.

The station involves no novel engineering features with the exception that all auxiliaries are motor-driven, an independent turbine generating unit being provided to insure reliable operation of the auxiliaries. An economizer of unusual capacity is provided for feed water heating in place of the usual heaters supplied with auxiliary exhaust steam. Double furnace Sterling boilers have a balanced draft system with motor-driven blower and exhaust fans. Water for the surface condensers is taken from the intake tunnel of the nearby water works pumping station and restored, less makeup water, to the pumping station well. This water supply, coming from a depth of 125 feet below the lake surface five miles from shore, is free from refuse matter or liability of interruption. The plant is so located that coal is delivered from railroad cars by gravity to hoppers and from the hoppers by gravity to the furnaces through a motor-operated weighing tram car.

The guaranteed efficiency of the large generating units was exceeded under test, the actual minimum water rate per kilowatt hour being about 12.8 pounds. With coal costing

about \$1.70 per net ton delivered, the cost of power delivered to the switchboard in this plant should be unusually low.

The balance of the original bond issue of \$2,000,000, together with an additional \$747,000, a part of which at least was appropriated by the city council without referendum, has been used in the construction of transmission lines from the generating station to various substations and a limited amount of distribution system. The transmission and conversion system includes substations at East 11th street on the edge of the business district in connection with a water department high pressure pumping station; at East 79th street and Woodland avenue; at West 41st street, serving the old Brooklyn territory; and in Collinwood at the old generating station. The new substations are all substantial structures, suitable for their intended purposes. The generating station is also a distributing point for lines to the nearby section. The main transmission lines through the developed part of the city have been laid underground and some underground distribution work has also been laid. The total conduit work installed up to the end of 1915 includes about 900,000 duct feet and nearly 21 miles of conduit.

The new construction, aside from transmission lines to the territory formerly served by the old stations, has been limited largely to the section immediately south of the generating station served by a main trunk feeder running through East 55th street and a smaller district near the East 11th street substation. Comparatively little effort has been made to get business in the heart of the city, partly for the reason that this section is served by the Illuminating Company through an underground three-wire D. C. system, which the municipal officials decided was antiquated and inefficient and should not be duplicated. Converting apparatus has, however, been installed to a limited extent to accommodate D. C. business.

The number of customers served by the municipal plant has steadily increased, the total at the end of 1915 being not less than 15,000. The maximum load carried by the station up to the end of 1915 was in the vicinity of 8000 kilowatts, or one-third of the maximum capacity. In addition to the residence business served by the old stations, some comparatively large power business has been secured in the new East Cleveland section, resulting in an unusually high load factor which, with some modifications, has been used as the basis of estimates of the future operation of this plant.

The service so far rendered by the new system has been reasonably satisfactory and free from interruptions. Officials of the Illuminating Company have reported cases of some customers, such as moving picture houses which require very reliable service, having returned to their lines because of repeated embarrassing outrages of the municipal service.

Investment

As has already been stated, there were on December 31, 1915, outstanding bonds against the old and new lighting plants aggregating \$2,817,000. This does not cover the entire direct and indirect investment in the municipal lighting property. It does not include the land formerly owned by the Water Works Department upon which the new power plant is built which, under agreement between the two departments, is to be paid for on the instalment plan with interest in a twenty-year period. It does not include the temporary Division street plant referred to, which was installed for the Lighting Department by the Water Works Department. In addition to the above there were investments from tax levies, earnings and general funds for reconstruction and extensions of the South Brooklyn and Collinwood plants and for parts of the new distributing system. The exact amount of these investments is difficult to determine on account of the crude bookkeeping methods employed in the earlier years. Messrs. Nau, Rusk & Swearingen made a very careful search of old accounting and other records in order to raise at January 1, 1915, on the books of the plant an account called "City Investment" prescribed in the Ohio classification for municipal utilities (Acct. No. 923). The intent and scope of this account (which is designed solely to cure past accounting deficiencies and not for current entries) is very clearly and explicitly set forth in the Public Utilities Commission accounting instructions, yet the books of the plant when first examined by the accountants showed no evidence whatever of such an account or any definite substitute therefor although the items which should have been included therein amounted to over a half million dollars.

The commission prescribes as chargeable to this account among other things: cash payments from sinking funds, taxes or general funds, estimated taxes which the plant would have paid had it been privately owned, rent of public buildings, etc., supplies and services of other city departments, and all other

items as would be necessary "to place the municipally owned utility on the same basis as a privately owned utility." These items are offset in part by credits for cash, services or supplies delivered to other city departments, and both charges and credits bear interest compounded from the date of each transaction to the date of raising the account.

The intent of the prescribed accounting is to require each municipal plant to stand squarely on its own feet in the future and to start new records when the system became effective correcting any failure to so stand in the past. Such accounting methods if systematically applied would have a wholesome effect upon municipal plant history.

The accountants found chargeable to this account and not offset by services rendered items of cash advances, water not paid for, rents, workmen's compensation, damage payments, services of other city departments, and taxes foregone amounting to \$538,429.35 including interest compounded. The South Brooklyn records before annexation were too incomplete to determine charges of this kind and they were entirely omitted. Some were computed for Collinwood before annexation and a fairly accurate record of both plants after annexation was found.

The "City Investment" account total given above does not include the water works land upon which the new plant was built, valued at \$112,000 nor current transactions either debit or credit. The current net liabilities of the plant to the city alone at December 31, 1915, amounted to over \$60,000, exclusive of over \$70,000 matured but unpaid bond interest.

The above items of fixed investment may be summarized as follows:—

Bonds, E. Brooklyn plant.....	\$ 30,000.00
Bonds, Collinwood plant.....	40,000.00
Bonds, New East 53d street plant....	2,747,000.00
Bonds, Total.....	<u>\$2,817,000.00</u>
City Investment account.....	538,429.35
Water Works Land.....	<u>112,000.00</u>
Total fixed investment.....	<u>\$3,467,429.35</u>

Future Investment

It was apparently the city's intention to increase its investment in municipal lighting property only to the extent necessary

to load fully the new East 53rd street plant. This is evidenced by the following quotation from Municipal Lighting Plant Bulletin No. 1, issued in April, 1915:

"Our capacity, however, is only 24,000 kilowatts, which is practically one-fourth the capacity of the Cleveland Electric Illuminating Company and we could not, and it is not our intention to take the entire lighting and power load of the city of Cleveland. However, the capacity is sufficient and entirely adequate to demonstrate the commercial possibilities of making current for electricity and power at a maximum rate of not to exceed three cents per kilowatt hour. This should result in the Cleveland Electric Illuminating Company either reducing their rates to meet ours, or selling their plant to the city of Cleveland."

Assuming that the Cleveland Electric Illuminating Company does not develop a disposition to sell to the city and that future municipal investment will, therefore, be limited to further extensions of its lines, substation capacity, etc., to reach a sufficient number of customers to load its plant fully, it is possible to make an approximate estimate of the total investment and the results to be hoped for therefrom.

The plant expects to have 40,000 customers when fully loaded, an increase of about 25,000 over the present number. The corresponding increase in power plant load will be about 10,000 kilowatts.

It is common among engineers to estimate the value of distribution systems at from \$200 to \$300 per kilowatt of station demand. These figures are substantiated in the discussion of Mr. Ballard's American Society paper. One hundred dollars per customer may also be assumed as a fair approximate measure of distribution system costs. This corresponds with \$250 per kilowatt of capacity and is believed to be not excessive for this case in view of the fact that considerable more underground work will probably be required including expensive services in the business district. Further substation capacity corresponding to growth in business will be necessary, also a large investment in transformers, meters, services, etc., to reach the additional customers contemplated. The total further investment figured on the above basis would amount to \$2,500,000. This estimate together with the present recorded investment gives a total combined existing and prospective investment to load up the present power station of nearly \$6,000,000.

The plant management has never admitted the possibility of further expenditures of this order. It has represented that with plant, transmission lines, substations and some trunk feeders built it will only be necessary to run supply wires here and there at comparatively small cost to serve 25,000 more customers. While the exact present capacities of transmission lines, substations, etc., are not known, it is not probable that they would take care of the ultimate business without substantial increases, which, added to nearly normal distribution costs to reach customers of admittedly small average capacity and requiring a considerable amount of underground work, make an estimated total cost of about \$250 per kilowatt or \$100 per customer appear reasonable. The comparatively cheap Brooklyn distribution system stands on the books at more than \$75 per customer.

1915 Operating Facts

It appears that the forecasts of the success of the new plant were upon the basis of certain estimates of anticipated profits made by Commissioner Ballard and summarized on Page 54 of Municipal Lighting Bulletin No. 2 issued in September, 1915. This summary shows an estimated total cost of supplying service including all operating expenses, interest charges and depreciation of $1\frac{1}{4}$ cents per kilowatt hour. With respect to generating costs, these estimates are based upon experiences elsewhere and are not open to serious criticism. Other estimates are, however, based upon very inadequate evidence and appear to ignore entirely as already stated the future investment necessary to permit the sale of the maximum possible generated output of the plant. The inadequacy of these figures becomes apparent when they are compared with the actual figures to be presently discussed.

Based upon the showing apparently made in the first eight months of 1915, Commissioner Ballard estimates as follows: (Page 79, Municipal Bulletin No. 2) "We expect to actually make \$200,000 surplus for the year 1915. In 1916 this surplus will be greater than \$300,000 . . . Our plant is not yet half loaded. When it is being operated up to its capacity we believe that our surplus over operation, maintenance, and all fixed charges will be over \$500,000 per year. This money can then be used for extending the Municipal Lighting System, or the rates can be still further reduced."

After the end of 1915 the Division of Light and Heat

which operates the new system reported the following "actual" figures for the calendar year:—

Earnings.....	\$548,298.19
Expenses	
Operation & Maintenance	\$230,228.22
Fixed Charges.....	208,791.86
	<hr/>
Total.....	434,020.08

Profit..... \$114,278.11

Apparently the department's own methods of bookkeeping could show a so-called profit only a little more than half that "expected" by Commissioner Ballard. But when we turn to actual results as set forth in the accountants' report we find a still more amazing discrepancy. The "profit" disappears and is replaced by a large deficit. The accountants' figures for the twelve months ending December 31, 1915, follow:—

Operating Revenues

Municipal Street Lighting.....	\$ 84,662.72	
Other Municipal Light and Power	24,658.03	
Residence Light and Power.....	208,976.65	
Commercial Light and Power...	215,636.84	
	<hr/>	
	\$533,934.24	
Allowances, etc.....	1,184.42	
	<hr/>	
		\$532,749.82
Sale of Steam.....		10,066.67
Miscellaneous.....		5,738.23
		<hr/>
Total.....		\$548,574.72

Operating Expenses

Production.....	\$123,848.64	
Transmission and Distribution..	66,788.44	
Utilization.....	27,374.50	
Undistributed.....	16,655.54	
General.....	83,547.46	
	<hr/>	
	\$318,214.58	
Deferred Upkeep.....	110,455.16	
	<hr/>	
Total.....		428,669.74
		<hr/>
Gross Income.....		\$119,904.98

Deductions from Gross Income

Interest on Funded Debt.....	\$112,655.90
Other Interest.....	9,545.48
Interest on City Investment Acct.	24,229.32

\$146,430.70

Taxes Foregone.....	31,693.72
---------------------	-----------

Total..... 178,124.42

Loss, year 1915..... \$ 58,219.44

A comparison of the Department statement and the accountants' statement discloses several interesting facts. Operating revenues agree quite closely. Current operating expenses on the other hand are increased in the accountants' statement about \$88,000. Reference to more detailed but incomplete Department statements of expenses indicate that about \$50,000 of this discrepancy is in general expenses, including damages, rents, general office and other payrolls, uncollectible accounts, etc. The balance of the discrepancy is not readily located but apparently includes extensive maintenance charges which the Department had classified as construction. The commissioner in one of his statements with reference to certain revamping of old pole lines says that such work is "a legitimate charge against new construction."

The item of "Fixed Charges" in the Department statement includes interest, depreciation and certain administrative charges. The corresponding total in the accountants' statement is greater by about \$85,000. The largest factor of difference is in interest charges, the Department charging against operation only one-half the interest on outstanding bonds, the balance being charged to construction. The reason given for this procedure, which is in direct violation of the accounting orders of the Public Utilities Commission, were that "the plant was only half loaded." It would be logical on this basis to continue interest charges to construction indefinitely if the actual load at the power plant did not reach its rated capacity which it should not do if continuity of service is to be assured.

The other important item which the accountants increased is the depreciation accrual. They determined, after a careful study of the physical property characteristics and employing life data consistent with the Department's own judgment,

that \$110,455.16 should be reserved to provide for "wear and tear, accident, obsolescence, or changes in the art," this amount in their opinion being "rather too low than otherwise." The Department set aside for "deferred upkeep" only \$12,000, there being however a sinking fund reserve of about \$68,000 which was assumed to have a similar purpose. The sum of these two reserves is about \$30,000 less than the accountants' minimum allowance.

The above items account substantially for the difference between the Department's "profit" of over \$114,000 and the accountants' deficit of over \$58,000. As far as can be readily determined the Light Department, if it had followed the accounting orders issued by the Public Utilities Commission to municipal plants under its jurisdiction, would have shown results which could not have differed materially from those reached by the accountants. The accounting system prescribed by the state commission was adopted after extended conferences with utility officials in which the Cleveland commissioner was invited to participate. There is only one obvious reason why this system was not used in Cleveland instead of being completely ignored. That reason is that the real facts about the municipal plant operation would have been in such sharp and unpleasant contrast with oft-repeated forecasts and claims as to invite difficult and embarrassing explanations from the management.

The balance sheet of the plant as of December 31, 1915, prepared by the accountants shows an accumulated deficit from the beginning of the operations studied of \$194,007.15. This is to be contrasted with the expectations of Commissioner Ballard of annual surplus from \$200,000 to \$500,000, to be used for extensions and rate reductions. Further extended reference to the very comprehensive report of Messrs. Nau, Rusk & Swearingen is unnecessary. Their comments on accounting methods other than the ignoring of the prescribed system are, however, of passing interest. The following quotation is taken from their letter of transmittal:

"The delay in rendering this report and the almost inexplicable length of time it has taken to prepare the statements herein must be almost entirely attributed to the chaotic condition of the bookkeeping records for the year 1915 . . . This statement does not involve any special criticism upon the bookkeepers who had charge of making the final accounting

record. It involves rather a criticism of the bookkeeping machinery itself, which was erroneous in principle and mechanically impossible of being operated even by the most skillful of bookkeepers."

That the outlook for the plant is not a promising one in the opinion of the accountants is intimated by the following further extract from their letter:

"It is our opinion, however, that the future cost of maintenance and upkeep of the plant will show that any error in the estimates used in this report has been on the side of understatement rather than over-statement of the charges appropriate to a single year's history of the enterprise."

They also call attention to the fact that the entire faith and credit of the city are behind the plant's bonded debt without which it would have been impossible to finance at a rate as low as $4\frac{1}{2}$ per cent. Upon the assumption, which they apparently consider reasonable, that this rate would be doubled if the plant were financed upon its own credit only, they estimate that the 1915 deficit would have been more than \$200,000 without using this higher rate in accumulating the City Investment account to which it applies.

Possibilities of the Future

In view of the unquestionable present failure of the plant to pay its total annual costs by a considerable margin, and the doubts which have been expressed regarding the future, it will be well worth while to make some forecasts of the situation with such dependable light as is now for the first time available. The estimate of Commissioner Ballard that when operated up to capacity the plant would earn more than a half million dollars in excess of costs will be taken as the starting point because that situation, physically, is the next logical step beyond present conditions.

To make an intelligent estimate it is necessary to start with certain fairly well defined assumptions. Commissioner Ballard assumed that the present station can safely carry a peak load of 18,000 kilowatts. With this load, any one machine might be disabled without curtailing service with the available overload capacity of the new machines. This peak load has, therefore, been accepted as reasonable. Commissioner Ballard then assumed that 40,000 customers will be served when this peak load is secured; also that the annual load factor would be

40 per cent. This load factor is somewhat less than that now carried by the municipal plant and is less than that of the Illuminating Company by approximately 10 per cent. Conditions will, however, be radically different when the plant is fully loaded with 40,000 customers. The bulk of these customers will be residences, with quite low load factor. While the plant now has some good load factor power business it will not be possible to increase this class of business in proportion because the municipal rates for large customers with good load factor are higher than the Illuminating Company's rates. Cost of service seems to be the only important factor in determining which system the average customer will patronize. It is, therefore, a quite serious question whether a 40 per cent load factor is possible. However, with an approximation thereto the plant would generate about 60,000,000 kilowatt hours per year. Allowing for the unusually high station electric power consumption and the necessarily increased percentage of transmission, conversion and distribution losses, there would remain for sale approximately 45,000,000 kilowatt hours per year. With the load factor assumed a considerable proportion of the future new business must be power, probably in small units.

With the above assumptions it is possible to construct an estimate of the future financial possibilities under the present general policy of operation. It is estimated that when the load reaches 18,000 kilowatts and the sales 45,000,000 kilowatt hours and the customers 40,000 the operating revenues will be \$950,000. This is at the rate of 2.11 cents per kilowatt hour, almost exactly the same as prevailed in 1915, although there has been a constant reduction in average rate since the present schedule became effective. The increase in revenue over 1915 of about \$400,000 is \$16.00 for each of 25,000 added customers, appreciably higher than the average annual residence revenue. It may be assumed that the 19,000,000 kilowatt hours additional sales are distributed approximately as follows:—7,000,000 lighting at the maximum rate of 3.0 cents and 12,000,000 kilowatt hours power at 1.5 cents, somewhat higher than the present average. The proportion of lighting assumed in the increased business is considerably greater than in the present business; the power business is in smaller units.

Current operating expenses are estimated at \$633,000. They assume a somewhat lower unit power cost because of the greater output although a continuance of the present very high

cost of fuel, which is not improbable, would involve a considerable increase instead of the assumed decrease. Other operating expenses are estimated somewhat higher per kilowatt hour because of the large increase in number of customers. This number has a very considerable effect upon distribution, utilization and general expenses although the total of these expenses per customer is reduced. The ratio of total operating expenses to operating revenue is $66\frac{2}{3}$ per cent, somewhat higher than the present ratio but still quite conservative considering the low revenue rate. The expense estimates are consistent with the experience of other municipal plants which have kept accurate cost records.

All other charges, including deferred upkeep, interest and taxes are assumed for the new investment on the same basis as set forth in the accountants' statement of actual 1915 charges and added to these charges. Some of the estimates may appear out of proportion to the increase in investments, but this is accounted for by parts of the present investment not carrying full charges—taxes for example.

□ The estimates as explained above are summarized in round figures in the following table:

Operating Revenues	\$950,000
Operating Expenses	
Current Expense	\$633,000
Deferred Upkeep	222,000
	<hr/>
	855,000
	<hr/>
Gross Income	\$ 95,000
Deductions	
Interest	259,000
Taxes	69,000
	<hr/>
	\$328,000
	<hr/>
Loss	\$233,000

The loss shown above is almost exactly four times the actual loss in 1915, a discouraging outlook if it cannot be improved. Let us see if improvement is possible. The revenue being admittedly low it is natural to attempt to increase it by higher rate business—within the limits of the schedule in effect. This would mean more small customers, poorer load factor,

less kilowatt hours sold within the limits of the assumed safe maximum load, increased investment in lines, increased customer expense, and no ultimate gain. If on the contrary large customers are sought to increase the load factor and kilowatt hour sales the rate per kilowatt hour must be reduced to meet competition or the underground district invaded, involving very large distribution investment and again no ultimate gain. If the plant capacity limitations assumed are ignored for possible increases in revenue the added interest charges on power plant and lines will again more than offset the added revenue.

If there is still skepticism regarding the unfavorable future showing, let us see the effect of possible concessions.

If it were possible to add the entire assumed new business with only half its assumed added investment, there would be a deficit of over \$100,000.

With no added investment whatever except services to the assumed new customers there would still be a deficit.

With no provision whatever for depreciation there would be an appreciable deficit. With such provision reduced to the bare bond sinking fund requirements and no charge for taxes a deficit would remain.

If the city waived charges for interest on the City Investment account as well as taxes (in continued violation of accounting instructions) there would be an insufficient balance for bond sinking fund requirements to say nothing of a full depreciation reserve.

If it were possible to keep future current expenses down to the present cost per kilowatt hour, and the city waived taxes and interest on the City Investment account, and depreciation reserves were limited to the bare bond sinking fund requirements, the deficit would not be entirely wiped out.

As no combination of the possible (and impossible) concessions in charges will remove the troublesome deficit, the revenue end may be studied for possible relief.

With expenses and charges unchanged it would be necessary to increase the average rate 25 per cent to wipe out the deficit without loss in business.

With the probable reduction in consumption resulting from increased rates it would be necessary to increase the average rate by not less than 30 per cent, possibly 35 per cent, to wipe out the deficits.

With losses of customers to the competing company as

well as reductions in consumption the necessary increase in average rate to wipe out the deficit would be further increased to say 40 per cent or 50 per cent.

Increases in the average rate which avoided an entire loss of large power business must leave the present minimum rates practically undisturbed. This means substantially doubling the maximum rate.

Readjustment of rate schedules which would hold sufficient business to theoretically avoid a deficit would result in rates not appreciably lower than now charged by the private company.

The holding of business by a municipal plant with the same rates as a private plant is exceedingly problematical because of the usual superiority and reliability of private plant service.

From whatever angle the municipal plant estimates are viewed, it is found that the inter-relation of rates and load factor, together with the keen competition of the Illuminating Company for large business, all make it impossible to work out any substantially better showing for the plant than that contained in the above table. The logical tendency will be for small, low load factor business to drift to the municipal plant, resulting in limited output in proportion to demand, high unit expenses and charges and low revenue.

The above estimates have assumed that the city could finance its lighting plant venture to an indefinite extent on a $4\frac{1}{2}$ per cent basis. It is doubtful if this can in fact be done. The first bonds on the new municipal plant bore 4 per cent interest; subsequent issues had a $4\frac{1}{4}$ per cent rate; all recent issues have been $4\frac{1}{2}$ per cent bonds. It would be quite logical if with increasing proportion of the city indebtedness for such unprofitable and unnecessary purposes the interest rate increased to not less than 5 per cent.

The city has adjudged that 6 per cent is a proper return on investments in the local railway system over which it exercises the closest supervision. If this rate were applied to the municipal light plant investment its annual deficit in the future estimates given above would be increased to about \$319,000 or more than one-third its operating revenues.

Regardless of speculations as to the future it is obvious that the municipal plant is now only partly supported by its customers, the balance of its requirements coming from the general tax payers. A study of the 1915 income statement shows

that, as a matter of actual cash, a part was paid by tax payers of the past and a part may be passed on to those of the future. In the long run there is no way of making the deficits good except through tax levies. Customers of the plant have no special obligations after their current bills are paid. Only a small proportion of the tax payers are customers of the plant and there is no definite relation between their increase in taxes and their saving in light and power bills. Presumably the latter is greater, leaving those who have no direct benefit from the plant's low rates to bear a part of its cost.

It is, however, claimed by the municipal plant advocates that, aside from possible direct benefit to its own customers, the municipal plant has benefitted the entire city by forcing reductions in rates of the Illuminating Company. The extent of the annual saving to the combined customers of the municipal and private plants was estimated by Commissioner Ballard in 1915 as over one million dollars. If this were true there would be the shadow of an excuse for the existence of the municipal plant although the ethical standing of an unprofitable municipal venture whose sole object is to force a private enterprise to also lose money through excessively low rates is, to say the least, questionable.

The claim is, of course, made by the municipal plant advocates that the charges of the Illuminating Company are extortionate and that municipal competition was necessary to save the citizens from such excesses. The facts of the case are that the maximum rate of the Illuminating Company is ten cents per kilowatt hour charged only to residence customers and that the average rate of residence customers is approximately $6\frac{1}{2}$ cents because the ten cent rate is the primary step in a demand rate, the secondary step being five cents. A $6\frac{1}{2}$ cent average charge for residence service is quite reasonable, in fact is lower than that found in many of the large cities. The Illuminating Company's commercial rate for small business is $6\frac{1}{4}$ cents per kilowatt hour. Large business, both lighting and power, is handled on a Hopkinson rate which has an unusually low fixed charge per month and also an unusually low energy charge, the last step being only 0.4 cents. Except, therefore, for the possibility of the ten cent maximum being considered high, no obvious criticism is to be made of the Illuminating Company's rates, and they are not a valid excuse for starting a competing municipal plant.

A part of the alleged saving is in street lighting, for which

rates have been reduced. It will be of interest to see what truth there is in this claim that the reduction in street lighting costs has been due to municipal plant competition. This plant has assumed a part of the street lighting business, but so far there has been no reduction in the number of lamps furnished by the Illuminating Company. The yearly rate for arc lamps charged the city by the Illuminating Company from 1906 to 1915 as taken from Municipal Lighting Bulletin No. 2 (Page 69) is as follows:

1906—	\$69.72
1907—	67.92
1908—	54.96
1909—	54.96
1910—	54.96
1911—	53.88
1912—	51.96
1913—	49.80
1914—	49.80
1915—	49.80

From these figures, published by the city itself, it is shown that the Illuminating Company has made five reductions in arc lighting rates since 1906, all prior to the time the municipal plant started, and has made no reduction since. In fact, the large reductions were all made before the present plant was projected.

While a similar set of figures has not been compiled covering reduction in commercial rates, it is stated by Illuminating Company officials that they have made reductions from time to time somewhat similar to the reductions in street lighting rates, as has been done by nearly all progressive companies throughout the country and that these reductions were not forced by municipal competition. The claim of the municipal lighting department to saving by citizens on account of forced reduction in private company rates, therefore, fails and the municipal plant must stand upon its own financial results to justify its existence.

The Outlook

A comparison of the 1915 statement of operation from the municipal plant with estimates of future operation contained herein shows that the actual 1915 deficit is a considerably smaller percentage of the gross than the estimated future deficit. The reason for this is that while at present the power

plant investment is not fully utilized, the distribution system is comparatively simple, a large part of it being that taken over from the old plants. Future investment to reach the large number of customers necessary to load the plant will be comparatively expensive, involving, as already indicated, underground work and other increased costs incident to work in the more highly developed parts of the city. While, therefore, it may be possible to somewhat reduce the present deficit by increasing saturation of the present generating and distribution investment, the time will necessarily come when the deficits will again increase if the present policy and rates are continued.

If it were possible to complete the loading of the present station apparatus with power business in large units of high load factor, a more favorable showing might be made, but as already indicated this is impossible due to the extremely low maximum rate which requires a correspondingly high minimum rate. It would, therefore be most economical for the city to stop its investment in this venture at a point in the near future when the present distribution system is saturated and the possibility of reaching moderately large and concentrated customers through inexpensive additions had been exhausted. The deficits might, under such circumstances, be somewhat less than at present, but there appears to be no possibility of fully paying for the cost of service from revenue at the present rates even under most favorable circumstances of investment utilization.

As pointed out, the use of this venture as a club to force reductions in the Illuminating Company's rates has not succeeded and it would be unwise to face increasing deficits from the municipal plant with the idea of further attempting to force reductions in the Illuminating Company's rates and saving money to the community as a whole. Such a procedure, even if feasible, would be economically unsound because the city's tax payers as a whole would pay for reduced cost of electricity supplied to a comparatively small proportion of their number.

A considerable point has been made in Cleveland, as in other cases of municipally owned utilities, that the customers get cheaper service because the municipalities can obtain money at much lower rates than can private corporations. While this is true to a limited extent, so long as the general credit of the municipality underlies the utility investment, it would not continue equally true in the long run on a large scale.

The city of Cleveland now has a bonded indebtedness of

over \$60,000,000, all that the law allows. This debt has increased from about \$14,000,000 in 1902 when the first of its subsidiary lighting plants began to operate. It has been stated in the Cleveland press that about half the present city tax levy is required to meet bond interest and sinking fund requirements. There is constant demand for needed public improvements, such as sewers, paving, school buildings, water supply, etc., which cannot be financed other than by the city itself. If the city through avoidable exhaustion of its borrowing capacity makes these improvements impossible, it is stifling its civic development and pride of its citizens and balking their well-known ambition for expansion.

It is very unfortunate that the facts of the municipal plant situation were not publicly known on November 7, 1916, when the voters of Cleveland authorized the sale of \$1,750,000 additional bonds for extensions of the system. There is a strong probability, to say the least, that this authorization would have been withheld if the voters had been informed that there was no likelihood that the plant would ever earn the charges on its present investment, to say nothing of the proposed fifty per cent increase. The Cleveland voter may well ask why he was kept in ignorance of the facts so vital to his intelligent vote, which facts must have been known in substance at least by the city officials prior to the issue of the complete report of the accountants on November 16, 1916. Cleveland citizens as well as the larger public have been repeatedly and widely assured that Cleveland's three-cent light venture was successful and increasingly profitable. Most of these assurances came from Commissioner Ballard who designed and built the plant and from the mayor under whom he served. Commissioner Ballard's connection with the municipal plant ceased on January 1, 1916. He has since served the city of Memphis as consulting engineer in connection with a projected municipal plant. His representations of the success of the Cleveland plant presumably had considerable influence in securing the authorization of a \$1,500,000 bond issue for the proposed plant. It is of interest to note that the city officials of Memphis have recently decided not to build the authorized plant, and have made new contracts for lighting with private companies. While the published reason for abandoning the municipal plant was that the actual cost and time required for construction were found to far exceed the original expectations, it is quite

possible that the disclosure of the real facts about Cleveland may have influenced the decision.

Conclusions

(1) The new municipal lighting plant in Cleveland, together with outstanding obligations of predecessor plants, involving a total investment of nearly \$3,500,000 at the end of 1915, was not then paying its operating expenses, interest charges, taxes, and a suitable provision for depreciation, according to a report of public accountants employed by the city.

(2) While the plant is still in the development stage, indications are that it has nearly reached its point of most economical development.

(3) A business sufficient to fully load the present generating plant, with necessary increases in distribution system, customers, etc., will show a greater proportionate loss than at present, the deficit being about one-fourth of the gross earnings.

(4) It will be impossible to make any rate schedule with a 3 cent maximum pay the entire cost of electric service in Cleveland under prevailing and probable future conditions.

(5) Conditions in Cleveland are unusually favorable to low cost of service, particularly with respect to fuel cost and efficiency of generation in the new municipal plant.

(6) A rate schedule which would permit the municipal plant to pay all costs of service should be at least as high with respect to both maximum and average rates as the schedules now in use by the Illuminating Company.

(7) The present rate schedule is inequitable in that no reductions are made for either load factor or quantity for installations of less than 10 kilowatts. The unit cost of service to a 1 kilowatt customer may be less than to a 100 kilowatt customer under some circumstances.

(8) The only present fundamental difference between the municipal lighting proposition and the Cleveland Electric Illuminating Company or any other similar private company, is the comparatively low rate at which funds are obtained by the municipality. This difference will tend to disappear as the municipal investment in utility property increases. Ultimate differences, if any, will be more than offset by less efficiency in municipal management.

(9) So long as Cleveland continues to operate its municipal lighting plant with a 3 cent maximum rate, the tax payers

as a whole will pay a part of the cost of such electric light and power as certain tax payers and others may elect to obtain therefrom.

COMPARISON OF NEW ENGLAND RUN-OFF DATA

BY D. M. WOOD

Water Supply Paper No. 415, entitled "Surface Waters of Massachusetts," recently issued by the United States Geological Survey, gives in one place all the available stream flow records of this district, including some hitherto unpublished, and also those for the climatological year ending September 30, 1915. "Daily Deficiency Tables" are given for those rivers which have continuous and reliable records.

In reviewing this paper, in an attempt to establish for purposes of power studies some relation between the flow characteristics of the streams, the writer has compiled some of the information in a way that he believes is new. The compilation is given in the form of tabular comparisons, although the same data might be presented graphically. All computations have been made on the slide rule, and irregularities of computation have not been smoothed out.

The method of presentation follows closely along the lines outlined by the writer in a paper entitled "Power Estimates from Stream Flow and Rainfall Data" given in the *Journal of the Boston Society of Civil Engineers* for March, 1916. It is a comparatively simple method for determining the probable power and energy at a given site when stream flow records are available.

In that paper it was shown that the most convenient final arrangement of the flow data was in the form of a "Per Cent of Time-Flow" table, the flow being given at 5 per cent intervals. Such a table is only another way of presenting the same information as is shown on the well-known "Duration of Flow Curves." The use of a fixed scale of per cent. of time for comparison of the unit run-off from several streams is a decided advantage when studying the distribution of the run-off for any given period of time. Naturally the longer the period the more likely are irregularities of flow to be compensated for and the more uniform will be the result in duration of flow curve or table.

A comparison of the unit run-off per square mile for various New England streams, mostly Massachusetts, is given in Table I, where the scale of comparison is percentage of time, irrespective of the length of the period of record.

These comparisons are made between streams having average run-offs which vary between wide limits.

In discussing the method used above (*Journal of Boston Society of Civil Engineers* for June, 1916), Mr. Allen Hazen suggested the comparison of the percentage of time that given flows were available, the flows being expressed as a ratio of the given flow either to the average or median flow. For the purposes of making power estimates, however, the writer has found it more convenient to reverse the scale and to use "Per Cent. of Time" as the fixed scale and the corresponding ratios of flow to the average as the variable.

A comparison of the New England records contained in Water Supply Paper No. 415, using this last method, is given in Table II.

As in studies of rainfall data, a real comparison can only be made when the records cover not only the same number of years but also the same calendar years, with the minor exception that in the case of run-off, artificial or natural storage conditions may affect the beginning and end of the period under consideration.

The possibilities of this method of comparison are shown in Table III in which the records at Holyoke and Orford on the Connecticut River are compared with the records at Lawrence on the Merrimac River for corresponding periods. The rivers have sufficient diversity of rainfall, storage and physical characteristics to make these comparisons interesting.

The comparisons presented do not cover a sufficient number of cases or sufficient range of locality to permit of drawing any very definite conclusions at this time. It is hoped, however, that this outline of the methods will induce others to make similar compilations for records in their own locality and offer them for comment.

TABLE 3—COMPARISON OF MERRIMAC AND CONNECTICUT RIVER RECORDS FOR SAME YEARS

Per cent. of Period	Second-feet per square mile				Ratio of flow for given per cent. time to average			
	October, 1890, to September, 1899		October, 1900, to September, 1915		October, 1890, to September, 1899		October, 1900, to September, 1915	
	Merrimac River at Lawrence, Mass. (4663 square miles)	Connecticut River at Holyoke, Mass. (8390 square miles)	Merrimac River at Lawrence, Mass. (4663 square miles)	Connecticut River at Orford, N. H. (3100 square miles)	Merrimac River at Lawrence, Mass. (4663 square miles)	Connecticut River at Holyoke, Mass. (8390 square miles)	Merrimac River at Lawrence, Mass. (4663 square miles)	Connecticut River at Orford, N. H. (3100 square miles)
100	0.008*	0*	0.011*	0.093	.005*	0*	0.008*	0.054
95	.332	0.306	.198	.285	0.21	0.21	.145	.17
90	.441	.364	.339	.360	.28	.25	.25	.21
85	.495	.416	.409	.420	.32	.29	.31	.24
80	.548	.467	.478	.480	.35	.32	.36	.28
75	.598	.525	.540	.540	.38	.36	.40	.32
70	.654	.584	.581	.615	.42	.40	.44	.36
65	.744	.660	.621	.685	.48	.45	.47	.40
60	.810	.750	.677	.770	.52	.51	.51	.45
55	.905	.842	.746	.860	.58	.58	.56	.50
50	1.038	.934	.836	.960	.68	.64	.68	.56
45	1.140	1.052	.985	1.08	.73	.72	.70	.63
40	1.309	1.182	1.048	1.23	.84	.81	.78	.72
35	1.497	1.368	1.170	1.40	.96	.94	.88	.82
30	1.745	1.570	1.354	1.65	1.12	1.08	1.02	.96
25	2.03	1.815	1.590	1.97	1.30	1.24	1.19	1.15
20	2.37	2.145	1.952	2.37	1.52	1.47	1.46	1.38
15	2.84	2.58	2.42	3.10	1.82	1.77	1.82	1.81
10	3.46	3.26	3.12	4.15	2.22	2.24	2.34	2.42
5	4.73	4.47	4.19	6.20	3.08	3.06	3.14	3.02
0	17.6	13.72	13.40	18.07	11.28	9.40	10.06	10.54
Average flow cubic feet- seconds per square mile	1.56	1.46	1.338	1.712	1.56	1.46	1.333	1.712

*Flow controlled by power plant.

CONTEMPT FOR THE COMPETENT

Editor Stone & Webster Journal:—

"The Life of John Marshall," by Senator Beveridge, is interesting reading at this time. In particular the chapter "Antagonism to Government" shows that demagoguery similar to that which is rampant today existed then, and that there were similar dangers.

The majority of us believe in a democracy; but if that form of government is to continue, men with training, experience and demonstrated ability must give freely of their time and counsel, and the people must listen and learn of them rather than be led by theorists without experience, who indulge in platitudes but have not enough backbone to stand up for justice and humanity no matter what the price, as did the men of the Revolution—Washington, Marshall, and a host of others whom we all honor.

The demagogues of the Revolution attacked the real leaders, who fortunately for us then were of the Government; but unfortunately for us now the present attack by the demagogues has been of such long duration and so insidious that they have placed themselves in positions of power, where their inability to handle large undertakings has resulted in profligate waste and mismanagement of government finance and business. They have wormed their way to power by unearthing a few flagrant abuses and then insinuating that similar abuses honeycomb every successful organization that has attained a certain definite size. They have, for example, taken a few acts of the "Standard Oil," which consisted of doing to some one exactly what that some one was trying to do to Standard Oil but was not bright enough to do (this does not condone the offence, but it does stamp the loser as a "squealer"). They have ignored and not paid honor to the ability that conceived and built up an organization which has so covered the world that the writer has seen the little tin can of the Standard Oil wherever he has traveled, be it among the highest peaks of the Himalayas or the Andes, and this business has been developed while our little men have slept and allowed England and Germany to build up their export trade while our demagogues wrangled over a few extra dollars that one or two men had collected, the income of which they could not spend on themselves but had to

use for the good of us all by developing new industries, the majority of us meanwhile spending on ourselves every cent we earned and having nothing to contribute to the advancement of the nation.

Marshall saw "the people" pass laws repudiating their debts—Jefferson, in France, experienced the results of these laws and found that "the nonpayment of our debts and the want of energy in our government" discouraged a connection with us and prevented him from getting a loan in France to aid in opening the Potomac. The same accusation in somewhat different form is heard today—"we do not honestly fulfill our foreign contracts"—how can we build up foreign trade when the very "people" who are railing at "big business" are themselves resorting to even worse methods than those they criticise.

Again, Senator Beveridge refers to taxes and shows how "the people" tried to shift the burden of taxes to the shoulders of the competent and to tax initiative, even as the demagogues are trying to do today.

Almost the worst lie on our statute books is the Income Tax. It purports to say that incomes under \$3,000 are exempt from taxation, but the man who through stock ownership holds title to the equity of a property pays his tax, but it is collected from the corporation in order that he may be blinded and not realize it. The politicians think the taxpayer will not discover the subterfuge, and, if he does, what does it matter—the people have the vote and the taxes are levied on and collected from the provident few who have dared to save and dedicate their savings to the promotion of the interests of the community.

No one should begrudge the payment of taxes necessary to administer a government properly conducted in a business-like way, but in order to bring about this Utopia the voters must be made to realize the present profligate waste and inefficiency, and this can only be done by taxing everyone whether he earns little or much, by making every voter pay a proportion of the total tax based on his ability, so that he may feel directly any increase or decrease of taxation and may know with certainty that if he votes for or allows waste he will himself have to pay for it.

I know that this sounds old-fashioned and that the "advanced thought" of today will brand me as behind the times, but as a citizen I receive just as much protection from my country as the richest man in it does and I have a certain pride

in paying my way in direct proportion to my ability. I do not wish to be a highwayman and just because my class is more numerous hold him up and force him to contribute to my support.

We need more of the rugged commonsense and the clear cut thought of men like Marshall, Chief Justice of the United States.

* * *

REAL PREPAREDNESS

Editor Stone and Webster Journal:

Much is now being said in regard to nitrate preparedness, and various recommendations are being made by able scientists, economic theorists and interested promoters, all with a view to helping the government spend \$20,000,000 appropriated by Congress to establish a nitrogen industry.

Without claiming to be in the first category enumerated above, and denying membership in the last, the writer wishes to call brief attention to a few points.

In undertaking any enterprise, government or private, it is always well to know what it is we are trying to do; intelligent effort is thereby much more consistently and progressively obtained. Let us therefore ask ourselves, are we trying to prepare the country—nitrogenwise for defense under government direction, or are we trying to establish a nitrogen business with the government for a partner? Many might reply "Both." A little consideration will show that this may easily be a straddle too wide even for Uncle Sam's long legs and youthful elasticity.

Preparedness nitrogenwise involves the prompt and continuous supply of sufficient oxidized nitrogen to maintain explosive defence and offense in behalf of the national safety. The question of competitive profit is beside the point. When the nation is in danger the cost of that which will insure its safety is immaterial.

The establishment of a nitrogen business involves ultimate efficiency of processes, cost of power and materials, comparison with competing supplies, and many other business considerations.

What might be hopeless from a mere business point of view might easily be most sound and even economic as a defence measure.

It has been stated that to actually defend ourselves we should need 200,000 tons of sodium nitrate or equivalent oxidized nitrogen per year.

That means we need that quantity on hand now, that the same or greater quantity must be on hand each and every day hereafter. To make that amount by the process largely used in Norway would require 250,000 K. W. continuously for a year. No such amount of power is available in one place at present.

While it is easy to show that far more power than this is available as surplus power, it is distributed in such relatively small parcels that the establishment of the necessary plants would be almost impossible as an immediate emergency measure for defense, and from the business standpoint futile.

Immediate preparedness in this department may be achieved only by the purchase of Chile nitrate, which can be procured, provided transportation can be furnished. Three or four years' supply could be acquired and stored in government warehouses, against which might be issued special legal tender notes payable in money or nitrate at the option of the government. Nitrate so stored and unused would be available for peaceful pursuits at such time as the millennium arrives without physical loss.

So much for immediate preparedness. What of the future, when possibly the Chilean supply is cut off? Let the government spend part of the \$20,000,000 to investigate the worth of different processes from a purely national safety standpoint. Let these investigators determine upon the best, most adaptable, most fool-proof and practical processes and apparatus which can be used in connection with available supplies of surplus or primary power or with existing gas and coke plants. Let them devise "take down" plants which should be analogous to machine guns, let them arrange to train industrial militia companies in their use. Then use some of the government's preparedness purse to build a sufficient number of such plants, which when set up wherever the power or gas by-product is available can supply the needed nitrogen.

What the power or by-product costs is of no consequence. "When the nation's life's in peril we've no time to think of men"—nor money. The industrial militia should drill regularly with a unit of such a plant, just as the National Guard drill with their arms.

If this work should develop a commercial business possibility, well and good; but the commercial side should best be left to private enterprise.

Preparedness is preparedness and business is business; the former counts no cost save honor, the latter may count no honor save profit.

BETA

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The managers of the companies operated by Stone & Webster write to Stone & Webster Management Association about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Amsterdam, N. Y., January 18th:

Post office receipts for December, 1916, were \$8,760, against \$8,626 the previous year.

The post office in Amsterdam reports the best year in its history, with a gain of \$6,014 over 1915. The Postal Savings banks report a gain of \$12,232. The Amsterdam Savings Bank also reports its greatest year, there being an increase of \$420,000 deposits.

December brought to a close a very successful year for Amsterdam from a general business point of view.

Manufacturers have been exceedingly busy, but owing to a scarcity of labor and yarn, their output has been somewhat curtailed. Apropos of the scarcity of labor, the fact has been mentioned that four new mills are being completed for spring operation with a requirement of about 800 men and women.

Retail merchants report large sales during December; the Christmas trade was the best in several years.

On December 22 the Edison Company put into service, the new 1000 c.p. ornamental street lights, 100 of these taking the place of 22 series enclosed arcs. The illumination is excellent and the posts are considered very ornamental.

Over \$100,000 was paid out by the Trust Company to members of the Christmas Club, half of which was undoubtedly distributed among the various merchants.

Ballston Spa, N. Y., January 18th:

Bank clearings for December, 1916, were \$608,406, against \$694,582 the previous year.

Post office receipts for December, 1916, were \$1,741, against \$1,792 the previous year.

Beaumont, Tex., January 16th:

Bank clearings for December, 1916, were \$4,313,704, against \$3,714,366 the previous year.

During December, 1916, 83 building permits were issued, valued at \$156,500, against 62 the previous year, valued at \$58,886.

Post office receipts for December, 1916, were \$9,229, against \$11,444 the previous year.

For the first time in its history, Beaumont passed the million dollar mark in the value of the building permits issued for one year. The bank

clearings for the year show a big increase over previous years. Nearly half a million barrels of oil and 4,500,000 feet of lumber were shipped from the Port of Beaumont during December, 1916. Several large oil and lumber vessels are scheduled to arrive for cargoes within the next month from all parts of the world.

Bellingham, Wash., January 16th:

The general business situation was characterized by no unusual occurrences during December, 1916. There was a good volume of Christmas trade, merchants reporting that the month's sales exceeded those of December, 1915, by a fair margin.

The lumber camps are operating on a larger scale than for years past, while the mills, with very few exceptions, are running at capacity. The box car shortage still continues a depressing factor, and is forcing the mills to store great quantities of sold lumber in their yards.

The farmers and dairy men are prospering and evidences of this prosperity in the shape of new houses, silos and barns are appearing in many places on the Skagit Flat country. Some building is also being done in the towns. At Burlington, a new theatre, costing about \$5,000, is nearing completion.

With the improvement in the car situation which seems to be gradually approaching, there should ensue a general improvement in business. About the middle of December, it was estimated that there were about 354,535,000 board feet of ordered but unshipped lumber in 125 mills of the Northwest. This is much in excess of the normal unshipped balance. The total value of this ordered but unshipped lumber on the Northwest coast is probably about four and one quarter million dollars.

Post office receipts for December, 1916, were \$9,218, against \$9,604 the previous year.

Brockton, Mass., January 8th:

Savings bank deposits in Brockton are reported as \$14,200,370, against \$12,507,580 a year ago.

During December, 1916, 36 building permits were issued, valued at \$59,220, against 18 the previous year, valued at \$48,475.

The shoe shipments from Brockton in 1916 amounted to 795,634 cases, or 19,890,850 pairs, an increase of 100,715 cases or 2,517,875 pairs over 1915. The valuation of the 1916 output is estimated at \$69,390,635. Included in this total are approximately 2,400,000 pairs of army shoes with an estimated value of \$10,537,500.

It is estimated that the wages paid to shoe workers during the year 1916 amounted to \$1,600,000 more than for the year 1915.

From the above figures, it would seem that Brockton has had a good volume of business the past year, and it is the opinion of some of the leading manufacturers that the business outlook for the year 1917, is very promising.

The city's valuation shows an increase of \$1,468,904.

Canastota, N. Y., January 18th:

Bank clearings for December, 1916, were \$129,549.

Post office receipts for December, 1916, were \$1,980, against \$1,683 the previous year.

Columbus, Ga., January 8th:

Bank clearings for December, 1916, were \$2,045,066, against \$2,252,-347 the previous year.

Post office receipts for December, 1916, were \$9,886, against \$8,914 the previous year.

After a little slackness during the holidays, the mills are under full headway again, with orders on hand to run them well into the new year.

Other lines of business are good, the holiday trade being the best ever experienced by the merchants.

The receipts of our railway department for December, 1916, showed a good increase over 1915. The receipts of the lighting department also showed a gain. The figures for the twelve months were, in both cases, larger than those for 1915.

The receipts of the Columbus Power Company for December, 1916, showed a substantial gain over 1915, and this is true also of the twelve months' receipts.

Dallas, Tex., January 10th:

Building permits for December, 1916, were valued at \$236,015, against \$311,169 the previous year.

Real estate transfers for December, 1916, were \$2,602,168, against \$1,767,113 the previous year.

Post office receipts for December, 1916, were \$152,337, against \$127,971 the previous year.

For the year 1916, bank clearings were \$499,470,954, against \$357,-822,044 the previous year; building permits were valued at \$4,293,464, against \$3,420,512; real estate transfers were \$24,755,805, against \$21,201,-898.

A new record for the local post office is established by the receipts for December, 1916.

The real estate market is picking up slightly. Several large deals were made during December. The value of transfers in December exceeded those for any month since November, 1914.

December business in Dallas and vicinity confirmed the most optimistic expectations. Local stores handled the largest holiday trade in their history. Flourishing conditions are looked for during the coming months.

As was to be expected during the holiday period, the wholesale and jobbing trade experienced a temporary lull. With the turn of the year, however, the wholesale business has begun to pick up again.

Our railway receipts for December, 1916, are 14.7 per cent greater than for the corresponding month in 1915. The increase is due entirely to improved business conditions. Electrical receipts for December, 1916, showed an increase of 18.2 per cent over the previous year.

Everett, Wash., January 8th:

During December, 1916, 29 building permits were issued, valued at \$6,475, against 16 the previous year, valued at \$12,995.

Post office receipts for December, 1916, were \$8,458, against \$10,864 the previous year.

The situation in the lumber business is, considering the car shortage, very good. The demand seems to be very active for this season of the year, and is in fact greater than the capacity of the carriers to handle. The mills report that they are getting from 60 to 75 per cent of the cars they need to fill their orders. Prices are firm and have been gradually rising for several months.

Fall River, Mass., Jan. 5th:

Bank clearings for December, 1916, were \$7,183,095, against \$6,841,194 the previous year. For the year 1916, the bank clearings were \$84,956,305, against \$65,517,884 in 1915.

During December, 1916, 24 building permits were issued, against 34 the previous year. During the year, 1916, 584 permits were issued, valued at \$2,284,742, against 644 in 1915, valued at \$1,824,776.

Post office receipts for December, 1916, were \$19,873, against \$20,300 the previous year. Post office receipts for the year, 1916, were \$176,945, against \$164,962 in 1915.

The favorable conditions among our cotton mills, which started in the fall of 1915, continued throughout the year 1916, with every prospect of being maintained for some months to come. The selling price of cotton cloth has very nearly doubled during 1916, and there are no signs of a turn of the tide. During 1916, we sold the greatest number of ranges, water heaters, room heaters, and other appliances ever sold by this company in one year.

Fort Madison, Ia., January 6th:

Post office receipts for December, 1916, were \$3,018, against \$2,987 the previous year.

The volume of business assumed by the Fort Madison retail business houses in December exceeded that of any previous year.

The industries of this vicinity have not been notably affected by the manufacturing demand created by the European war, the cause of the unprecedented volume of trade enjoyed by the retail stores here being due to the prosperity of the farmer.

There is a general feeling of optimism in Fort Madison.

At Dallas City, the outlook is not so bright, though the farmers are obtaining good prices for grain and the resultant increased purchasing power should bring increased business to the stores.

The receipts of the Fort Madison Electric Company for the year 1916 increased 11 per cent over the previous year.

Fort Worth, Tex., January 8th:

Bank clearings for December, 1916, were \$51,851,876, against \$44,044,756 the previous year.

During December, 1916, 25 building permits were issued, valued at \$218,695, against 51 the previous year, valued at \$81,240.

Post office receipts for December, 1916, were \$46,639, against \$40,245 the previous year.

The receipts at the Fort Worth Stockyards for December, 1916, showed a notable increase in every item.

Bank clearings for the year 1916, were \$487,328,982, against \$435,-289,425 the previous year; the value of building permits was \$2,127,199, against \$1,166,907; post office receipts were \$471,406, against \$431,327. The stockyard figures for the year 1916 were larger in every particular than for the preceding year, noticeably so in the case of cattle and hogs.

At the close of business on December 27, 1916, the five national banks reported total deposits of \$34,991,328, against \$19,898,542 on December 15, 1915. The state banks had on deposit \$4,917,889, against \$2,661,274 a year previous.

There is a large amount of building in progress at this time, including a storage warehouse to cost \$125,000.

In the surrounding territories there is now great need of rain for the winter grain crops.

The receipts of the Northern Texas Traction Company for December, 1916, showed an increase of 16.3 per cent over the previous year. For the year 1916, they show an increase of 13.1 per cent.

Conditions at Cleburne are reported to have been very good during the month of December and the outlook for the coming year is good. Post office receipts for the year 1916, will reach \$30,000, an increase of 10 per cent over 1915. There is more money on deposit in the banks than at any previous time. Earnings of the Tarrant County Traction Company for December, 1916, show a gain of 16 per cent. A new two-story brick building, to be used as a theatre and costing \$16,600, is being built, as well as a number of new houses in the residential district.

Galveston, Tex., January 6th:

Bank clearings for December, 1916, were \$28,924,063, against \$23,-152,301 the previous year.

Bank clearings for the year 1916, show an increase of approximately \$9,500,000 over 1915. The high price of cotton, wheat and other commodities exported from this port during the year, especially during the rush shipping season of the fall, accounts for the big increase in bank clearings.

The volume of business reported for December, 1916, was \$124,-023,000, against \$109,116,000 the previous year.

During December, 1916, 102 building permits were issued, valued at \$24,425, against 213 the previous year, valued at \$52,736.

Post office receipts for December, 1916, were \$16,632, against \$20,-524 the previous year.

Business conditions in Galveston are still below a satisfactory point, though cotton shipments for the month show a slight increase over December, 1915.

Glens Falls, N. Y., January 18th:

Bank clearings for December, 1916, were \$1,201,604, against \$928,-441 the previous year.

Post office receipts for December, 1916, were \$7,059, against \$7,083 the previous year.

All the mills and factories continued to run at full time during De-

ember. Merchants report the best Christmas trade in their history. Briefly, the month of December was a record-breaking month.

Max Kurzrok & Company, the new shirt-waist concern which located here some four or five months ago, are continuing to increase their load and taking on additional help. They are still advertising for labor.

It is understood that the Glens Falls Lumber Company has received another large war order for some sort of a wooden plug.

Haverhill, Mass., January 15th:

The Haverhill Savings Banks report total deposits on December 31, 1916, of \$13,738,830, against \$12,793,265 last year, an increase of 7.39 per cent.

During December, 1916, 37 building permits were issued, valued at \$131,000, against 22 last year, valued at \$357,550.

Shoe shipments for December, 1916, were 54,667 cases, against 44,338 cases last year.

General business conditions are exceptionally good.

Houghton, Michigan, January 12th:

Post office receipts at Houghton for December, 1916, were \$3,746, against \$3,745 the previous year.

The output of the copper mines for December, 1916, is estimated at 25,000,000 pounds. The Christmas holidays were responsible for a smaller production than had been estimated for the month. The January output is expected to be 30,000,000 pounds unless severe weather prevents the ore from being shipped from the mines.

This has been the coldest December within the record of the Weather Bureau, a period of about fifteen years. Merchants, however, report that the holiday business was better than for years.

Houston, Tex., January 11th:

Bank clearings for December, 1916, were \$58,420,442, against \$49,-574,396 the previous year.

During December, 1916, 224 building permits were issued, valued at \$292,243, against 248 the previous year, valued at \$509,603.

Real estate transfers for December, 1916, were \$2,876,569, against \$1,219,978 the previous year.

Post office receipts for December, 1916, were \$62,901, against \$58,-000 the previous year.

Bank clearings for the 12 months of 1916, were \$570,068,411, against \$451,537,076 the previous year; the value of building permits were \$3,-086,870, against \$2,196,244; real estate transfers were \$18,874,826, against \$10,060,036; post office receipts were \$644,926, against \$565,665.

It is a general feeling among the business interests of Houston and the surrounding country that the year 1917 will witness restoration to normal conditions after two and one-half years of war in Europe.

The farmers have never, during the past fifteen or twenty years, enjoyed greater prosperity than at the present time. Manufacturers, as a rule, are unable to fill all orders. Working people are better paid today and are being kept more steadily at work than ever before in this locality.

It is believed that a healthy revival of real estate activity will set in early this year.

The receipts of the Houston Electric Company for December, 1916, showed an increase of 21.48 per cent over the previous year. The receipts of the Galveston-Houston Electric Railway Company for the same period showed an increase of 7.47 per cent.

Keokuk, Ia., January 6th:

Post office receipts for December, 1916, were \$8,512, against \$8,175 the previous year.

General business conditions during December, 1916, were exceptionally good and the outlook for the immediate future is considered very promising.

Local wholesale houses, as a rule, report that their output for the year 1916 was somewhat larger than for the preceding year.

The receipts of our company for December, 1916, show an increase over the previous year.

Key West, Fla., January 5th:

Post office receipts for December, 1916, were \$2,312, against \$2,206 the previous year.

Custom-house receipts for December, 1916, were \$39,261, against \$17,047 the previous year.

During December, 1916, 6,591,410 cigars were manufactured, against 3,124,520 the previous year.

The general business outlook is at present extremely favorable. The cigar factories have large outstanding orders and will resume work after the inventory period with full forces.

Both our railway and lighting receipts for December, 1916, show substantial increases over the previous year.

Lake George, N. Y., January 18th:

Post offices receipt for December, 1916, were \$352, against \$415 the previous year.

There are no new buildings under construction at present, but several new camps are to be built in the early spring on the East side.

Lowell, Mass., January 16th:

Bank clearings for December, 1916, were \$4,721,624, against \$4,184,042 last year and \$3,409,805 in 1914.

During December, 1916, 45 building permits were issued, valued at \$73,180, against 25 last year, valued at \$39,895.

Post office receipts for December, 1916, were \$25,628, against \$24,321 last year.

The 12 months' figures show the following results:

Bank clearings for 1916 were \$51,963,361, against \$42,979,362 in 1915, and \$39,319,596 in 1914; building permits were valued at \$1,703,408, against \$1,157,483 in 1915; post office receipts were \$211,238, against \$192,207 in 1915.

General business conditions continue good in Lowell and the surrounding territory, and the indications are that business will continue good for some months to come.

Middletown, Conn., January 10th:

During December, 1916, 5 building permits were issued, valued at \$10,010, against 5 the previous year, valued at \$5,280.

Post office receipts for December, 1916, were \$5,071, against \$5,202 the previous year.

Good general business conditions are looked for during the immediate future. The past few months have been prosperous in a healthy way and no striking change is expected.

Oneida, N. Y., January 18th:

Bank clearings for December, 1916, were \$444,736, against \$251,795 the previous year.

Post office receipts for December, 1916, were \$4,254, against \$4,445 the previous year.

In spite of the fact that all the merchants and manufacturers in Oneida report 1916 as being the most prosperous year in their experience, there has been very little building activity.

Paducah, Ky., January 6th:

Bank clearings for December, 1916, were \$4,709,416.

During the month, business conditions have been very good. The Christmas trade has been exceptional, in spite of the fact that practically none of the tobacco crop was marketed before Christmas.

The price of tobacco has been steadily climbing and is now higher than ever before in the history of the industry. It is probably not too much to expect that this condition will mean greater prosperity for this community in 1917 than has been experienced in many years. It is said that 70 per cent of the crop has already been sold, and that at the present rate the entire crop will be disposed of within sixty days. It is intimated that approximately 15,000,000 pounds of tobacco will be marketed in Paducah, whereas in 1916 probably slightly under 12,000,000 pounds were disposed of here.

Pawtucket, R. I., January 4th:

Banks report an increase of 10 per cent in commercial accounts over 1915, and an increase of 15 per cent in savings accounts.

During December, 1916, 7 building permits were issued, valued at \$20,900, against 8 last year, valued at \$30,000.

Post office receipts for December, 1916, were \$20,038, against \$21,720 last year.

General business conditions in December were excellent. The mills continue to run over time and nights, and the demand for skilled labor and raw material is greater than ever. Freight embargoes and shortage of cars have greatly handicapped the movement of manufactured goods. Manufacturers realize that as long as the war continues all lines will

flourish, and they have orders in hand at present that will keep things moving for many months to come.

The cotton mills are all busy. The lace and silk mills operate at full capacity with plenty of orders in hand, and narrow fabrics and fancy textiles report excellent conditions. The iron and steel industry also reports excellent conditions; peace rumors have not seemingly affected their activities to any extent.

Merchants report the best holiday trade in their experience, claiming fully 40 per cent increase over last year's business.

The sales of our gas department for December, 1916, showed an increase of 4 per cent over the previous year, and those of the electric department an increase of 13 per cent.

Pensacola, Fla., January 6th:

During December, 1916, 207 building permits were issued, valued at \$58,636, against 114 the previous year, valued at \$11,129.

Post office receipts for December, 1916, were \$11,958, against \$11,995 the previous year.

Exports for December, 1916, were \$1,202,553, against \$523,457 the previous year.

Local merchants all continue to report an improvement in business conditions and agree that the outlook for the new year is very satisfactory.

Both our lighting and our railway receipts for December, 1916, show an increase over the previous year.

Port Arthur Tex., January 18th:

Building permits for December, 1916, were valued at \$26,630, against \$56,958 the previous year.

Post office receipts for December, 1916, were \$4,614, against \$3,745 the previous year.

The exports of the Sabine district for December, 1916, were \$3,572,973, against \$3,946,279 the previous year.

Imports of the Sabine district for December, 1916, were \$98,221, against \$72,845 the previous year.

The general business outlook for the immediate future appears to be exceedingly good.

Reno, Nev., January 10th:

Bank clearings for December, 1916, were \$2,009,275, against \$1,371,534 the previous year. For the year 1916, bank clearings were \$20,590,437, against \$15,264,530 the previous year.

Building permits for December, 1916, were valued at \$14,510, against \$5,600 the previous year.

General business conditions continue good.

Saratoga, N. Y., January 18th:

Bank clearings for December, 1916, were \$398,559, against \$407,712 the previous year.

Post office receipts for December, 1916, were \$5,844, against \$6,092 the previous year.

The Adirondack Trust Company has moved to its new banking quarters and our company has installed eight projector lights for its outside illumination.

Savannah, Ga., January 9th:

Bank clearings for December, 1916, were \$29,228,485, against \$26,-580,881 the previous year.

During December, 1916, 37 building permits were issued, against 27 the previous year.

Post Office receipts for December, 1916, were \$31,556, against \$28,-083 the previous year.

Cotton receipts for December, 1916, were 93,168 bales, against 110,457 bales the previous year.

Resin receipts for December, 1916, were 42,283 barrels, against 45,408 barrels the previous year.

Turpentine receipts for December, 1916, were 7,636 barrels, against 6,530 barrels the previous year.

High prices and activity in naval stores are making this community prosperous. Bank clearings for December were practically as large as in the bumper cotton crop year of 1913.

Our railway receipts for December, 1916, showed an increase of about 18 per cent over the previous year, and our light and power receipts an increase of about 14½ per cent.

General conditions in Southeast Georgia are very prosperous. Labor, both white and colored, skilled and unskilled, is still very scarce. General construction work in the Port Wentworth district is helping the city very greatly.

Seattle, Wash., January 16th:

Bank clearings for December, 1916, were \$76,007,390, against \$54,-496,255 in 1915.

Building permits for December, 1916, were valued at \$445,290, against \$605,305 the previous year.

Real estate transfers for December, 1916, amounted to \$778,694, against \$1,818,189 the previous year.

Foreign exports for December, 1916, were \$7,696,961, against \$4,045,-208 the previous year, and \$1,870,385 in 1914, and domestic exports were \$3,363,618, against \$4,290,674 the previous year, and \$2,709,750 in 1914.

Foreign imports for December, 1916, were \$14,317,582, against \$9,046,918 the previous year, and \$3,508,149 in 1914, and domestic imports were \$6,378,316, against \$5,650,429 the previous year, and \$3,303,135 in 1914.

December business conditions were good in all lines of trade, with labor fully employed.

Shipbuilding yards are working at capacity, with contracts enough in force to keep them busy for two years.

Wheat growers of the Eastern Washington wheat belt are beginning to release their holdings. There has been one trade of 100,000 bushels

which had been held since harvest, and it is announced that the rest of the growers are ready to sell.

Sydney, Nova Scotia, January 18th:

During December, 1916, 5 building permits were issued, valued at \$8,200, against 4 the previous year, valued at \$2,580.

Customs receipts at Sydney for December, 1916, were \$56,173, against \$37,249 the previous year.

The output of the Dominion Coal Company for December, 1916, was 304,793 tons, against 398,642 tons the previous year. For the twelve months of 1916, the output was 4,090,802 tons, against 4,609,006 tons in 1915.

Shipments of the Dominion Coal Company for December, 1916, were 261,623 tons, against 338,592 tons the previous year. For the twelve months, the shipments were 4,299,420 tons, against 4,235,263 tons in 1915.

Prosperous conditions continue to prevail throughout Cape Breton except in the Glace Bay colliery districts, where the reduction in output naturally resulting from the scarcity of labor has prevented business from reaching the same high level as elsewhere in the country.

The large amount of construction proposed by both the Dominion Steel Corporation and the Nova Scotia Steel & Coal Company should favorably affect business conditions the coming year.

Tacoma, Wash., January 9th:

Bank clearings for the year 1916, were \$116,810,914, against \$98,668,247 the previous year.

During the year 1916, 1,372 building permits were issued, valued at \$1,617,981, against 1,216 the previous year, valued at \$790,424.

Real estate transfers for the year 1916, were \$2,766,232, against \$2,508,745 the previous year.

Post office receipts for the year, 1916, were \$295,935, against \$274,588 the previous year.

Tacoma's foreign commerce for the first 11 months of 1916, totaled \$95,836,535, against \$49,901,739 the previous year. This broke all records for the port.

The total foreign commerce for the customs district for the state of Washington for the first 11 months of 1916, amounted to \$319,271,979, against \$162,615,971 the previous year.

On January 6, 1917, Pierce county, by an overwhelming vote, authorized the issuance of \$2,000,000 in bonds for the purchase of 70,000 acres of prairie land to be donated to the Federal Government for an army post at American Lake, south of Tacoma. A minimum of 15,000 troops with 6,070 officers will be quartered there. It will be the manoeuvre grounds as well for the National Guard troops from the entire northwest. Upwards of 100,000 men may ultimately be seen in manoeuvres on the prairie land. The establishment of the post is of very great significance to Tacoma and the entire northwest. Appropriations are already available and the actual work on the post will be begun as soon as the land has been

condemned and all the local formalities complied with. The payroll and cost of supplies for the post will run into the million of dollars annually.

Preliminary work has already been begun on the plant of the newly organized Todd Shipbuilding & Dry Dock Corporation, in which local men, together with Eastern financiers, are interested. The site of 100 acres covers 4 tide land blocks. With one exception, the new site is the largest of any shipbuilding and dry dock company in the United States. Arrangements are now being made to extend the tide flats car line on Eleventh street to reach the plant as the new yards will employ at the outset some 1,500 men. It is expected that within three months ship construction will be under way.

Tampa, Fla., January 3rd:

Bank clearings for December, 1916, were \$4,572,686, against \$4,630,-177 the previous year. For the year 1916 the bank clearings were \$51,322,-056, against \$50,273,402 the previous year.

Building permits for December, 1916, were valued at \$95,830, against \$69,370 the previous year. For the year 1916 they were valued at \$1,296,-148, against \$1,396,044 the previous year.

Customs receipts for December, 1916, were \$141,828, against \$112,965 the previous year. For the year 1916 they were \$1,887,945, against \$1,801,-086 the previous year.

Internal revenue for December, 1916, was \$96,656, against \$70,971 the previous year. For the year 1916 the receipts were \$1,001,987, against \$939,222 the previous year.

The value of water commerce in December, 1916, was \$3,108,499, against \$3,005,282 the previous year. For the year 1916 the value of water commerce was \$37,576,358, against \$34,519,230 the previous year.

During December, 1916, 31,515,540 cigars were manufactured, against 30,325,000 the previous year. For the year 1916 the number of cigars manufactured was 312,456,000, against 281,003,000 the previous year.

The cigar manufacturing business is still strong, with plenty of orders for the next few months. The usual shut down for one or two weeks after the holiday season, is not taking place in the leading factories.

General business is improving steadily and the indications are that the present season will show decided improvement over the past year.

Watervliet, N. Y., January 18th:

Post office receipts for December, 1916, were \$3,191, against \$2,311 the previous year.

Woonsocket, R. I., January 15th:

During December, 1916, 15 building permits were issued, valued at \$22,250, against 16 the previous year, valued at \$9,575.

Mills are continuing to operate at capacity and retail merchants report larger Christmas sales than ever before.

The labor situation seems to be somewhat relieved, due to cessation of considerable construction work.

The receipts of both our electric and gas departments for December, 1916, showed an increase over the previous year.

News from the Companies

Boston Office

Mr. E. S. Webster and Mr. D. P. Robinson have returned from a trip to Seattle, as have also Mr. G. O. Muhlfed and Mr. F. S. Pratt.

Mr. Gardner Rogers has been appointed manager of the Woonsocket Division of The Blackstone Valley Gas and Electric Company.

Mr. John W. Turner, Georgia School of Technology, 1915, has joined the statistical department.

Mr. C. H. Sayre Merrill, M. I. T. 1912, has joined the statistical department.

Mr. and Mrs. Hans von Vittinghoff have announced the birth of a son.

Mr. E. T. Moore, manager at Dallas, Tex., is visiting in Boston.

Mr. Fred H. Farnam and Mr. John H. Oakes are in Washington, D. C., assisting in the extension of the accounting department of the American Red Cross.

Mr. Earl H. Nelson has been transferred from the Houston Electric Company to the treasurer's office of the Management Association.

Mr. Thomas L. Small has been transferred from the treasurer's office to the accounting department of the Savannah Electric Company.

Mr. Rabb N. Kirkland, after spending six months in the Boston office, has returned to Paducah to take the position of chief clerk.

Mr. Fred L. Hopkins, formerly assistant treasurer of The Blue Hill Street Railway Company, has been transferred to the treasurer's office in Boston.

Miss Mary M. Dennison has been appointed assistant treasurer of The Blue Hill Street Railway Company.

Mr. Alvin W. Gordon has been transferred from the treasurer's office to The Blue Hill Street Railway Company.

Mr. Paul B. Williams, formerly chief clerk of the Mississippi Power Company, has been transferred to the auditing department at Boston.

Mr. and Mrs. Lawrence E. Eustis announce the birth of a daughter.

Baton Rouge, La.

On account of exceedingly bad weather the extensive preparations for the celebration of the one hundredth anniversary of the incorporation of the city of Baton on January 16 were partially abandoned. The indoor exercises of the program, including addresses by prominent men of the city, a series of historical tableaux and a musical concert, were carried out as planned, but the dress parade by the L. S. U. cadets, the street parade and the exhibition by the sailors of the United States torpedo boats temporarily stationed here were necessarily given up.

The three torpedo boat destroyers, "Sterett," "Monaghan," and "Lamson," made a week's visit at Baton Rouge on their journey up the Mississippi River. The present cruise up the river has for its purpose the

popularizing of the naval service among the people of the interior. The boats were open to the public daily and were visited by thousands of people.

The Louisiana State Penitentiary site, known as "The Walls," located in the heart of the city and comprising about a full square, has been purchased by the city of Baton Rouge for \$45,000. The city has purchased this property for the purpose of making a city park.

Probably the most sensational campaign ever undertaken in the city of Baton Rouge was the one just completed to raise \$50,000 for the erection and furnishing of a Y. M. C. A. building. Nearly every prominent business man of the city entered into this movement with enthusiasm, with the result that the end of the six day campaign showed a total subscription to the fund of \$63,500, with prospects of reaching \$65,000. The perfecting of the organization and the filing of a charter will be accomplished at once, when steps towards the purchase of a site and the erection of the building will be started.

Mr. I. M. Stover, former manager of The Key West Electric Company, has come to Baton Rouge as manager of the Baton Rouge Electric Company. Mr. Stover and his family arrived on January 5 and will go to housekeeping at once.

Bellingham, Wash.

Puget Sound is this season experiencing its normal winter weather; temperature occasionally as low as the freezing point, but generally a light, warm rainfall or days of warm sunshine. This in marked contrast to the storms and snow of last January. The result is uninterrupted activity this winter in the mills, logging camps, and upon the dairy and grain farms of Puget Sound. Prevailing high prices have stimulated all lines of activity, the farmers being among the greatest beneficiaries. The only "fly in the ointment" now seems to be the lack of shipping facilities—particularly box cars—and this has for several months handicapped the lumber mills. However, this is considered a transitory condition, and many of the mills are being enlarged or rebuilt in anticipation of continued good markets. Among those undergoing improvement in Bellingham are,—(1) the Morrison Mill, where complete electric drive is being installed and a new wood box factory constructed; (2) the waterfront plant of the Bloedel-Donovan Company, by construction of new office buildings and other changes to increase efficiency, and (3), the Puget Sound Mills & Shingle Company, which is installing electric drive throughout.

The high prevailing prices for farm produce are gradually wiping out the deficits created by last winter's cold spell. The demand for milk is particularly good; the dairyman is now getting over four cents a quart for his milk, and has to deliver it only as far as his own front gate. The condenseries operated by the John B. Agen Company in Mt. Vernon and Ferndale have just been bought by the Pacific Coast Condensed Milk Company, and another large condenser is under erection in Mt. Vernon.

The launching of a ship is always of interest, and the ceremonies incident to the christening of the steamship "Redwood," at South Bellingham, on January 23, were the occasion of a half holiday here. This is the first large ship to leave the ways here since the early "90's"—but the next interval will be somewhat shorter, for the "Redwood" will be followed

within a month or so by the "Firwood," and later in the year by at least two others.

The meeting and banquet of the Stone & Webster Club of Washington, held at the Hotel Washington, Seattle, last Friday, was attended and enjoyed by thirteen of us from the north of the Sound. The Bellingham delegation was led by Mr. Coffin, and included:—John Hickok, railway superintendent; C. W. Henderson, traffic agent; John C. Hector, assistant treasurer; B. U. Muffley, superintendent light and power department; W. L. Lockwood, chief operator power plants; Roy Samson, superintendent lines and wiring, Northern Division; R. W. Lindley, assistant sales manager; H. D. Burns, salesman; E. L. Noyes, purchasing agent; G. E. Springer, electrical engineer; L. J. Haight, assistant, engineering department; Frederick Johnson, advertising agent.

All of the Bellingham delegation had the pleasure of meeting Mr. Webster and the other members of the Boston party, and greatly enjoyed the dinner and other entertainment features. It is hoped that arrangements may be made some time during the summer for Bellingham to act as host to the club.

Fort Madison, Ia.

The Sinclair Oil Company is surveying a right of way through the city for the new pipe line from the oil fields to Chicago. The Perfection Tire & Rubber Company is shipping tires to its agents throughout the country.

A new industry which promises to become one of the most important in the city has been located and will probably be in operation before the end of 1917.

Work on the new buildings for the American Fork & Hoe Company is proceeding rapidly. This company is erecting a modern factory building near the State Prison. For many years it has operated within the prison walls.

The industrial development of Fort Madison continues and is a source of much encouragement to the commercial organizations that have spared no effort to bring the advantages of this location to the attention of manufacturers.

A. S. Nichols, manager, has returned from a month's vacation in Boston.

A. G. Gibbony, formerly manager of the Burlington Power Company, was appointed superintendent of the company on January 1. S. W. Carothers was transferred to the Dallas City Light Company as superintendent. O. F. Ware, operator of the Dallas City Light Company, was transferred to the construction department of the Mississippi River Power Company.

Fort Worth, Tex.

Mr. David Daly, of the Houston Electric Company, Mr. H. S. Potter, of El Paso, and Mr. R. E. Griffiths of the Beaumont Companies, have visited us during the month of December.

Mr. S. F. Wine, superintendent of the Arlington Light and Power Company, announces the birth of a son, January 7.

Effective January 1, the Fort Worth City Commission passed an ordinance forbidding the operation of jitneys on the two principal business streets, Main and Houston, from the Court House to East Front street. At present very few are attempting to operate with this restriction.

The conduit line connecting the city with the Lake Worth reservoir has been completed, and after being tested for a few weeks will be ready for service. This is the last link in the project which has been under construction for several years, and which will give Fort Worth a cheap and almost unlimited water supply for industrial and domestic purposes.

Houghton, Mich.

Mr. C. W. Kellogg, district manager, and Mr. H. T. Edgar, president of the Lighting Company, made a short visit during the latter part of January.

Mr. J. E. Gallaher has been transferred from the Northern Texas Traction Company, Fort Worth, Tex., to the Houghton County Traction Company, and has taken the position of master mechanic.

Mr. Alfred Pollard, student engineer at the Houghton Station, was recently operated on for appendicitis, and we are very glad to hear that the operation was entirely successful.

The Mineral Range Railroad Company reports that during the month of January it handled 547,000 tons of rock. This is the largest amount of rock ever handled in any one month by this road.

Mr. W. H. Balcke, who has been making an engineering study of our plant, has returned to Boston.

It has been announced that the Calumet & Hecla Mining Company will build the largest and best equipped hospital in the Upper Peninsula. Work will be commenced early in the spring.

Mr. Gardner Rogers, manager of the Houghton County Electric Light Company and Houghton County Traction Company, has been transferred to the position of manager of the Woonsocket Division of the Blackstone Gas & Electric Company, with headquarters at Woonsocket, R. I.

Mr. Otto Snyder, superintendent of the Electric Light Company, recently transferred to Adirondack Power Company, at Glens Falls, N. Y., has been temporarily re-installed at Houghton, as general superintendent of the Lighting and Traction Companies, until the arrival of Mr. Rogers' successor.

Mr. L. H. Knapp has been transferred from the Mississippi River Power Company to the Houghton County Electric Light Company. Mr. Knapp will be in charge of new business, with title of commercial agent.

Mr. W. J. Gilson, assistant superintendent of the Houghton Division, has been transferred to Calumet as superintendent in charge of the Calumet Division. Mr. P. I. Robinson, assistant superintendent of the Calumet Division, has been transferred to Houghton as superintendent of the Houghton Division.

Mr. Gardner Rogers recently made a business trip to Boston.

Mr. W. H. Balcke, of the Engineering Corporation, has arrived in

Houghton to make an engineering study of the plant and distribution systems.

The Quincy Mining Company has ordered a Nordberg hoist, capable of handling rock from a depth of 11,000 feet.

The first 75-horse power motor of the four units that are to replace the steam engine in the old Dollar Bay wire mill has been installed, and is now in operation.

December broke all previous weather bureau records for cold, the minimum temperature being eighteen degrees below zero.

Jacksonville, Fla.

Manager Hardy Croom has returned from a ten day visit to the Boston office.

Mr. F. M. Martzall has been promoted to the newly created position of purchasing agent of the company.

Judging from the rapidity with which Jacksonville's hostelrys and boarding houses are filling up, the 1917 crop of tourists bids fair to be the largest in the history of this city and the state at large. Southward travel by automobile is quite popular this year, it being estimated that 100 automobiles arrive daily via The Dixie Highway. Daily band concerts in Hemming Park for the entertainment of visitors will begin in a few days.

No less than five large oil corporations have established great fuel oil handling and storage facilities at this port. Jacksonville now boasts of the best facilities on the Atlantic coast, south of Philadelphia, for bunkering oil burning steamers.

Announcement is made that the National Rifle Shoot will again be held on the Black Point Range near this city during the coming summer. This will make the third successive year for the tournament on this range.

The three large shipbuilding plants here are enjoying busy times. One concern is working to capacity on the construction of steel vessels, while the others are building large schooners and sea-going barges of yellow pine.

Among the new industries recently established in this city is the large meat packing plant of Armour & Company. The operation of this plant will prove a big stimulus to the animal raising industry of the whole state.

It is expected that within two months will come the completion of the thirty foot deep river channel from Jacksonville to the sea. The completion of the project means much for the development of the port of Jacksonville.

The Commodore's Point docks and terminals development is rapidly nearing completion. Several of the naval stores exporting concerns are already occupying space at this location.

Merchants report a big volume of business during the recent Christmas season, and the business outlook for the present year appears quite encouraging.

Keokuk, Ia.

On the evening of January 16 the annual meeting of the Keokuk

Industrial Association was held at the Hotel Iowa, a dinner being served to the members with a business session following. The report of the retiring president, Mr. C. F. McFarland, reviewed the progress of the past year. References were made to industries secured in 1915 which have grown consistently in the last twelve months and are today employing an average total of 389 men and using a capital of \$815,000.00. The report of the association's treasurer showed receipts and disbursements during the past year of \$10,390.40. The following directors were elected for 1917: J. J. Ayres; J. Albert Kiedaisch; John Nagel; J. W. Collier; E. S. Phillips.

Keokuk is being backed in her campaign to secure the Government armor plant by the entire state of Iowa. Plans are now on foot to personally present to the Armor Plate Board in Washington the claims of Keokuk for the site of the proposed plant.

During January, the town of Montrose voted on the question of giving a franchise to the Keokuk Electric Company for the purpose of supplying that town with electric light and power. The result of this election was a unanimous vote in favor of the franchise, not a dissenting ballot being cast.

The extension of the McKinley avenue street car line was completed and in operation on December 18, 1916.

The High Tension Club held its annual banquet on January 17, 1917, at the Hotel Iowa, 140 members and guests being present. After the banquet the following speakers were introduced by President Frank J. Venning: Henry S. Walker, Toastmaster, Major W. B. Collins, Rev. J. W. Gillespie and Postmaster E. P. McManus. Short talks were given by R. B. Howland, J. P. Ingle, H. I. Sawyer and N. T. Wilcox. This banquet was one of the most enjoyable affairs given so far by the club. Plans are being made for an informal dancing party at the Elks Club in Keokuk on the evening of February 20.

Mr. C. W. Kellogg, district manager, visited the Boston office, Houghton and Paducah during January.

Mr. C. A. Sears, general superintendent of the Mississippi River Power Company, visited St. Louis during the latter part of the month.

Mr. L. C. Hall, purchasing agent of the Mississippi River Power Company, who has been ill with pneumonia, has recovered sufficiently to resume his duties.

Key West, Fla.

Key West seems to be getting her share of the tourists this year. Quite a number of strangers are stopping over a day or so on their way to Cuba, or on their return trip.

For ten days, beginning December 25, all the Key Westers enjoyed a carnival festival. The shows were of the better class, and in general the occasion was very successful.

All of the cigar factories are working very large forces, and this year promises to be a year of prosperity for Key West. The production for 1916 showed an increase of about 23,000,000 cigars over 1915.

The new train schedule went into effect on Friday, January 3. We have two north-bound trains and two south-bound trains a day. One each in the morning and afternoon.

December was an unusually dry month, in fact the dryest in the history of the Weather Bureau in this city, the total rainfall being only one-tenth of an inch. It was also considerably warmer than the average December.

Key West will shortly be the scene of much activity in the paving line. The material to be used will be marl and sand, with a top dressing of oil.

During the greater part of the month, we have had the torpedo flotilla in port. Scenes along the Government docks were quite interesting.

Lowell, Mass.

Mr. C. W. Harford, for the past two years cashier of this company, has been transferred to the accounting department of the Haverhill Gas Light Company. As a result of this change, Mr. Alden Lane, formerly of the Boston Office, has been assigned to the position of cashier.

Mr. Robert Forbush of the electrical department has recently been transferred to the light and power department of the Cape Breton Electric Company.

Mr. H. C. Eldridge, formerly of the Abington & Rockland Company, arrived January 8 to occupy position in our sales department.

The Lowell Dealers Automobile Show opened January 22 in the Kasino. A large attendance is reported.

Paducah, Ky.

On the night of January 12 a heavy fall of snow occurred in Western Kentucky. Additional snow fell on the nights of the 13th, 14th and 15th—in all a total of eight inches. Fortunately, owing to the intermittent nature of the fall, we were able to maintain fairly satisfactory street car service. This is the heaviest fall of snow we have had since January, 1912.

Messrs. W. F. Paxton and J. C. Utterback were recently sent to Washington, D. C., by the Board of Trade for the purpose of filing with federal authorities a brief setting forth the advantages of Paducah for the location of the proposed government armor plate plant. A number of cities are being considered in connection with this plant. It appears that Western Kentucky possesses many qualifications for the manufacture of armor plate, and as Paducah is the most favorably located city in Western Kentucky, leading citizens are inclined to the belief that the plant will be located here.

Pawtucket, R. I.

Mr. Gardner Rogers, for the past seven years manager of the Houghton County Electric Light Company and the Houghton Traction Company, has been appointed manager here to succeed Mr. Townsend.

Mr. James H. Rickard, the company's attorney, gave a very excellent talk on common law before the members of the Employees' Club at the bi-monthly meeting.

A Christmas tree and dance held on the 19th at the Employees' Club rooms proved a most enjoyable affair for the club members, their families, and invited guests.

During the past month the position of general superintendent of operating departments was created, and Mr. P. F. Hodgkins, superintendent of distribution, was appointed to the position.

Mr. Joseph Pratt assumed Mr. Hodgkins' former position, and Mr. W. L. Cheney was made foreman of the meter and arc lamp department, the position made vacant by Mr. Pratt's advancement.

The Goldmark Knitting Company has purchased land on Railroad street, where it will erect a mill 100 by 80 feet.

Pensacola, Fla.

Mr. Alba H. Warren, manager of the Galveston Electric Co., spent the holidays in Pensacola.

Lieutenant Commander, H. C. Mustin, of the Aeronautic Station, has been transferred to sea duty and has been succeeded by Capt. Jayne as commandant. The departure of Capt. Mustin, is regretted by all interested in the development of the Aeronautical School. The 1917 appropriation for the school is now available and many extensions and improvements will shortly be under way. It is planned to construct six new hangers capable of housing six to nine machines, and a large erecting and assembling plant. The new dirigible D-N-1 has arrived and is being assembled. The dirigible shed, a large steel structure, has also been completed. A great many jobs in both skilled and unskilled lines are and will be open and the pay roll is distinctly felt in the retail district of the city.

A new advertising plan has been launched to bring to the attention of the country the undeveloped resources of the Gulf Coast, comprising nineteen counties in Alabama, Florida and Mississippi. This new region will be called "Alaflamiss"—a combination of the abbreviations of the three states represented. It is planned to raise fifty thousand dollars a year for three years to exploit the advantages of "Alaflamiss." The scheme will consist of a nation-wide publicity campaign in magazines, newspapers, trade journals, and other periodicals, both through advertisements and stories—the legends of the Gulf Coast, of which there is an unlimited number. The business men of Pensacola are recognizing the value of such a campaign and are contributing their proportion of the cost.

The number of tourists in Pensacola at the present time is much greater than usual. Houses for rent are at a premium and boarding houses are filled to capacity.

Savannah, Ga.

Mr. William B. Latimer, who has been assistant engineer at our Riverside power plant, has been transferred to the Connecticut Power Company, Middletown, Connecticut, where he will have charge of the power plant.

Mr. David Moore of the commercial department has been transferred to the El Paso Electric Railway Company, El Paso, Texas, where he will have charge of the commercial department.

Mr. Walter J. Smith has been transferred from the Boston Office to the accounting department of this company.

The different bowling teams continue to keep up interest in the Com-

pany League. The Office happens to be leading at present, but several of the teams are about on a par in ability, so that change in the standing is the rule rather than the exception.

The Savannah Warehouse & Compress Company recently opened its huge plant for the storage and compressing of cotton. The company expects to handle only enough 1916 cotton to get its organisation working smoothly, but the greater part of Savannah's share of the 1917 crop will doubtless be handled here. The risk from fire on and near the water front will be measurably reduced by the removal of several hundred thousand bales of cotton to this new plant several miles outside of the city limits.

The Ulen Contracting Company continues to move through this port the material for its Uruguayan contract, in which the American International Corporation is interested. The schooner "Alice M. Colburn" will arrive here shortly to take on several thousand tons of pipe and supplies for the job. This is the "Colburn's" second trip to South America on this project.

Lumber interests at Port Wentworth, several miles up the Savannah River, are constructing a pulp and paper mill to use the waste products of the big saw mills there. This will be one of the first attempts to utilize on a large scale Southern timber for paper making. Power will be furnished by Savannah Electric Company, necessitating a line extension of several miles.

Three schooners of about 4,000 tons burden are building at new yards in the Mill Haven district above the city. Besides the ordinary equipment of sails they are to have twin screw-propellers driven by Diesel engines of about 300 horse power each. Most of the skilled workmen were imported from New England shipbuilding points, but the owners are trying to train local men so that the continuance of the industry need not depend on outside aid.

Seattle, Wash.

Seattle's Electrical Show for 1916 was an enlargement of and a great improvement over that of 1915, the date being placed close enough to the logical shopping days of the pre-holiday season to benefit the sales of electrical appliances.

The Press Club theatre, which was used for the 1915 show, was deemed too small for the 1916 occasion, so the second floor of the O'Shea Building, a new structure in the up-town district, was converted into a temporary amphitheatre. The change met with success. There was a large crowd of appliance manufacturers, brokers and retail dealers, central station men and others interested in electricity and applied sciences who participated in the most recent event that was promoted by the Society for Electrical Development.

The attendance was very large during the week and the show was interesting. There was music and many special demonstrations, and altogether the show went out in a blaze of electrical glory, and was pronounced by those participating, the press and the public, as a huge success. The men from this company who helped on the movement were largely from the sales department, Messrs. H. J. Gille. R. W. Clark and

L. R. Grant being active during the show week in bringing our affairs to the attention of the public.

The Company Christmas tree for the children of employees was held December 28, at the Hippodrome, with a record attendance of more than 2,000. A ton of candy, boxes of apples and oranges, and many toys were distributed during the opening hour, followed by an attractive programme of vaudeville and moving pictures.

The Electric Club is out with an announcement for a meeting to be held in the Contract Department of the Electric building on the night of January 30, at which time the Sales Department will contribute a minstrel programme.

Mr. W. E. Best, auditor, and Mr. F. P. Dexter, general accountant, who attended the meeting in Boston of representatives of the treasury and accounting departments of Stone & Webster companies, held early in December, returned to Seattle just prior to the Christmas holidays.

President A. W. Leonard and General Counsel James B. Howe, who were in Boston in December, returned to Seattle before the holidays.

Tacoma, Wash.

The establishment of a division army post at American Lake, south of Tacoma, will of course mean much to our companies. On January 6 the voters of Pierce County authorized the issuance of \$2,000,000 in bonds with which to purchase 70,000 acres of prairie land to be donated to the federal government for the Post,—the vote being almost 6 to 1 in favor of the bonds. The establishment of the post is of tremendous significance to Tacoma and the entire Northwest. Appropriations are already available and actual work on the post will be commenced as soon as the land desired has been condemned in court proceedings and all legal formalities complied with.

There are now twenty-six jitney busses operating in Tacoma. The Casualty Company of America, however, which wrote practically all jitney bonds in this state, has discontinued writing new business and is attempting to reinsure its outstanding risks. Whether or not the jitney bonds will be taken over by some other company in the reinsurance plan has not been definitely decided, but it is thought that no other company will care to enter into the business. About fifteen of the twenty-six jitney drivers' bonds will expire in February, and with no new company to reinsure them, the drivers will be forced to cease operating jitneys in Tacoma.

Mr. H. G. Winsor, superintendent of investigation and adjustments of these companies, has recently returned from a short visit in San Francisco and San Diego.

All departments are nicely settled in the new office building, which is being found very satisfactory in every way.

Tampa, Fla.

The number of tourists in Tampa is exceptionally large at present and the Gasparilla Carnival promises to be as great a success as ever. The South Florida Fair will again be held during the carnival week—February 2 to 10.

The two-story block recently completed on Lafayette street between Parker street and Plant avenue is appropriately named "Parkview," as it overlooks the City Park in front of the Tampa Bay Hotel. The lower floor contains ten stores and the upper floor is divided into a number of attractive apartments. This building increases considerably the beauty of the Hyde Park approach to the Lafayette street bridge.

We have recently installed large electric signs for Kress and Company, the Owen Cotter Jewelry Company, the Dairy Kitchen and the Purcell Drug Company. Several other large signs have been ordered and will add to the effect of our White Way lighting.

Heretofore it has been customary for the cigar factories to close from about December 22 to the end of the year, so as to take stock and also allow for the celebration of Christmas week by the workmen. Unfilled orders in the hands of the manufacturers necessitated continuous operation this year, however, with the result that cigar output for December was a record-breaker.

The Tampa Ship Building Company, recently organized, with a stock issue of \$750,000, will build its ship yards on the Ybor estuary. This company is expected to employ about a thousand men and will build steel ships only.

On November 23 a large audience watched the amateur performance "A Runaway Couple," given by the Tampa Electric Benefit Association. The cast of characters included Miss Lorena Edwards, Miss Eugene Cray, Mrs. C. A. Hellems, Mrs. R. P. Woodard and Messrs. L. W. Crompton, C. J. Reilly, R. P. Woodard and C. A. Hellems. The play, a two-act farce, was appreciated by the audience.

The change to oil-burning apparatus at the West Jackson street power station and the removal of the coal pile made possible an improvement in the appearance of the station grounds. This work is now completed and the grounds are very attractive. The most popular feature of the park is the dirt tennis court—one of the best in Tampa.

The Southeastern Section of the National Electric Light Association held its 1916 convention in Tampa on November 15, 16 and 17. The following Stone & Webster men attended: G. K. Hutchins, Columbus; T. W. Peters, Columbus; I. M. Stover, Key West; and E. S. Roberts, Savannah.

Mr. Arthur E. Blankenship was transferred to our accounting department on October 14 from the Boston office.

Mr. B. M. Harrison returned to work November 28 after a five months' absence due to typhoid fever.

Mr. W. M. Bird arrived from the Houston Electric Company on December 11 to take the position of assistant superintendent of transportation.

Mr. E. J. Seaborn attended the recent meeting in Boston of the assistant treasurers of the Management Association.

Mr. R. H. Williams was appointed purchasing agent on January 1.

Mr. E. B. Smith was placed in charge of the meter department on January 1.

Our lighting superintendent, chief clerk and storekeeper are celebrating the arrival of young sons, the dates as follows: to Mr. and Mrs. C. L. Howe, December 24; Mr. and Mrs. F. D. Gwynn, December 15; and Mr. and Mrs. D. L. Lamb, November 22.

On December 13 the Tampa Electric Benefit Association held its annual election of officers and directors. The following are directors for the coming year: L. W. Crompton, president; J. L. Stafford, vice-president; A. M. Hewitt, secretary; R. H. Williams, treasurer; C. L. Howe; F. E. Fletcher; and J. R. White.

COUPONS AND DIVIDENDS DUE

	Per Cent.
Feb. 1, Baton Rouge Electric Company 5s, 1939.....	2½
Feb. 1, Dallas Electric Corporation Coupon Notes, Feb. 1917.....	2½
Feb. 1, *Edison Electric Illuminating Company of Brockton Capital Stock.....	2
Feb. 1, Everett Railway, Light and Water Company 5s, 1941.....	2½
Feb. 1, Everett Railway, Light and Water Company, Capital Stock.....	1¼
Feb. 1, *Fall River Gas Works Company, Capital Stock.....	3
Feb. 1, Houston Electric Company 5s, 1925.....	2½
Feb. 1, Key West Electric Company, The, 5s, 1956...	2½
Feb. 1, *Lowell Electric Light Corporation, The, Capi- tal Stock.....	2½
Feb. 1, Pensacola Electric Company 5s, 1931.....	2½
Feb. 1, *Public Service Investment Company, Pre- ferred Stock, 6 per cent.....	1½
Feb. 1, Puget Sound Electric Railway 5s, 1932.....	2½
Feb. 1, Puget Sound Traction, Light & Power Company 6s, 1919.....	3
Feb. 1, Railway & Light Securities Company, Preferred Stock, 6 per cent.....	3
Feb. 1, Seattle Electric Company, The, 5s, 1929.....	2½
Feb. 1, Seattle Electric Company, The, 5s, 1930.....	2½
Feb. 1, *Sierra Pacific Electric Company, Preferred Stock.....	1½
Feb. 15, *Keokuk Electric Company, Preferred Stock, 6 per cent.....	1½
Feb. 15, *Tampa Electric Company, Capital Stock....	2½
Mar. 1, *Blackstone Valley Gas and Electric Co., Com- mon Stock.....	2
Mar. 1, *Central Mississippi Valley Electric Properties Preferred Shares.....	1½
Mar. 1, *Connecticut Power Company, The, Preferred Stock, 6 per cent.....	1½

*Payable quarterly.

	Per Cent.
Mar. 1, Edison Elec. Ill. Co. of Brockton (Coupon Notes) 5s, 1921.....	2½
Mar. 1, Hamilton Light and Power Company, The, 6s, 1922.....	3
Mar. 1, Jacksonville Traction Company 5s, 1931.....	2½
Mar. 1, Jacksonville Traction Company (Coupon Notes) 6s, 1917.....	3
Mar. 1, Northern Texas Electric Company Preferred Stock, 6 per cent.....	3
Mar. 1, *Northern Texas Electric Company Common Stock.....	1
Mar. 1, Pacific Coast Power Company 5s, 1940.....	2½
Mar. 1, People's Light, Power and Railway Company, Inc. 6s, 1917.....	3
Mar. 1, Seattle Electric Company, The, Seattle-Everett, 5s, 1939.....	2½
Mar. 15, *El Paso Electric Company Common Stock...	2½
Mar. 15, Galveston-Houston Electric Company Preferred Stock, 6 per cent.....	3

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

JANUARY 31, 1917

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	100	No	Pref	8%	168
Baton Rouge Elec. Co. { Bond, 1939 Notes, April, 1918	5% 6%	93½ 100	6%	92		.....
Blackstone Valley Gas & Elec. Co.	5%	102½	*6%	107	8%	160
Blue Hill St. Ry. Co., The	5%	91	No	Pref		.....
Brockton & Plymouth St. Ry. Co.	4½%	91				
Cape Breton Elec. Co., Ltd.	5%	93	6%	85	3%	51
Central Mississippi Valley Electric Properties	No	Bonds	*6%	78		12 N
Columbus Elec. Co. { Bonds, 1933 Notes, July, 1917	5% 6%	90 100½	6%	85		40
Columbus Power Co., The	5%	94		.....		.....
Connecticut Power Co., The	5%	98	*6%	96		100
Dallas Elec. Co. { Notes, Jan., 1921 Notes, June, 1917	6% 5%	101 99½				
Dallas Electric Corp. Bonds, 1922	5%	100		.....		.....
Eastern Texas Elec. Co. { Bonds, 1942 Notes, Dec., 1918	5% 6%	95 101	*6%	92	5%	67½
Edison Elec. Ilg. Co. of Brockton { Bonds, 1930 Notes, March, 1921	5% 5%	100 100	No	Pref	8%	175
El Paso Elec. Co.	5%	99	6%	100	10%	125
Fall River Gas Works Co.	No	Bonds	No	Pref	12%	250
Galveston Elec. Co.	5%	95		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	81 ^B / _L	.....	38 ^B / _L
Galveston-Houston Elec. Ry. Co.	5%	95	No	Pref		.....
Haverhill Gas Light Co. (Stock par value \$30)	No	Bonds	No	Pref	9%	98
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	97	6%	23	5%	17
Houghton County Traction Co.	5%	93	*6%	85		50
Houghton County St. Ry. Co., The	5%	100	No	Pref	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	100 ^B / _L		.....		.....
Jacksonville Elec. Co.	5%	98½	No	Pref	No	Com
Jacksonville Traction Co.	{ Bonds, 1931 Notes, March, 1917	5% 88 6% 100	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	97		.....
Key West Elec. Co., The	5%	72½		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	225
Mississippi River Power Co.	5%	77 ^A / _B		40 ^A / _B		12 ^A / _B
Northern Texas Elec. Co.	5%	95	6%	87 ^B / _L	4%	65 ^B / _L
Northern Texas Traction Co.	5%	101½	No	Pref		.....
Pacific Coast Power Co.	5%	98	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	80 ^L		15 ^L		5 ^L
Pensacola Elec. Co.	{ Bonds, 1931 Notes, Jan., 1919	5% 90 6% 99½	*6%	78		12
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	86		40
Puget Sound Elec. Ry.	5%	80 ^B		.....		.....
Puget Sound Power Co.	5%	97½	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	{ Bonds, 1919	6% 100½	*6%	71		30
Railway & Light Sec. Co.	{ First Series, 1935 Second Series, 1939 Third Series, 1939 Fourth Series, 1942 Fifth Series, 1944 Sixth Series, 1946	5% 100 5% 100 5% 100 5% 100 5% 100 5% 100	*6%	98	6%	95
Savannah Elec. Co.	5%	70 ^B / _L		20		5
Seattle Elec. Co., The	{ 1st Mortgage, 1930 Cons. & Ref., 1929 Seattle-Everett, 1939 The Seattle Ry., 1921	5% 102 ^B / _L 5% 97½ ^L 5% 93 5% 101½	No	Pref	No	Com
Sierra Pacific Elec. Co.	{ Notes, April, 1919	6% 99½	*6%	75		6
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	101	No	Pref	10%	130
Whatcom County Ry. & Lt. Co.	5%	93	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange. L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights.

LIBRARY NOTES

The Canada Year Book, 1915 (price, \$1.00), is probably obtainable from J. de L. Tache, "Printer of the King's Most Excellent Majesty," Ottawa, though the record shows that we received it as a gift. It is a well-made book, with over 700 pages, with a fine table of contents and detailed index. The frontispiece map is a convenience, and the headings in the contents are suggestive: Physical characteristics of Canada (including economic, geologic, and various geographical features); Area and population, for the latter comparing 1901 and 1911 under various subheadings; Climate and meteorology; Production, with such subheadings as Agriculture, Manufactures, Trade and Commerce; Transportations and communications, with electric railway statistics for 1901-15, as to mileage, passengers, gross earnings, etc.; Principal events of the year; Statistical summary of the progress of Canada.

Annual Report of the *Postmaster General* for the fiscal year ended June 30, 1916, is useful for its financial summary of audited revenues and expenditures.

The Report of the *Librarian of Congress* might at first glance seem somewhat remote from the Stone & Webster interests; but if we examine pages 120-123, in which are noted typewritten lists of the Division of Bibliography during the fiscal year ending June 30, 1916, we shall find such as the following: Advertising; Canberra, capital of Australia; City manager plan of municipal government; Commercial year books and similar publications; Information bureaus in Washington, D. C.; Bibliographies on New England States; Recent references on public service rates, with special reference to regulation (cabs, electricity, gas, street railways, telephone, water); Bibliographies on the regulation of public utilities; Research facilities in American libraries; Taxation of intangible property (with special reference to mortgages); Trade and commercial directories of foreign countries; Trade directories published in the United States.

Publications Issued by the Library of Congress since 1897, dated, January, 1917, is a remarkable collection of bibliographies, with a good index, which reminds one of the great amount of work that is to be done if he would know where to look for information on all the topics that are likely to come

within his interests. It is a fifty-page pamphlet, and in the index the following topics, and many others, are suggestive: Boycotts; Conservation; Cost of living; Cuba; Geographical atlases; Inheritance tax; Taxation of incomes; Valuation of railroads; Water rights; Workmen's compensation.

The American Labor Year Book for 1916 is a new undertaking and the table of contents has the following headings: The labor movement in the United States; Labor and the law; The socialist movement in the United States; The international socialist and labor movements; Social and economic conditions; Government and politics.

The Report of the Forester for the fiscal year ended June 30, 1916, has an interesting section on the use of the forest for water power development.

The Report of the Chief of the Bureau of Foreign and Domestic Commerce refers to trade directories and handbooks bearing upon South American countries, China, the West Indies, and Central America.

Engineering Index Annual, 1916. This is a good book, but has fewer pages than the 1914 edition, and the man who is looking for something bigger and bigger with each succeeding year might be tempted to find fault. It is easy, however, to explain this apparent discrepancy on account of the European War, which has naturally cut off many of the foreign publications. Therefore, when the war is over we are likely to see the Engineering Index swell to a larger number of pages than 368, though perhaps not for a number of years getting up to 542, the number of the 1914. A comparison of the Engineering Index and the Industrial Arts Index (which, by the way, is getting to be more and more indispensable) would be interesting. Just when to look in one and when in the other is a matter of judgment, the Engineering Index being only semi-alphabetical and the other quite strictly alphabetical. Each method has its advantages.

We have recently received two interesting pamphlets from the *Pan American Union*, Latin-American History and Description in Columbus Memorial Library, and Supplement, also a railroad map of Latin America.

"*The Taxation of Property and Income in Massachusetts*," by Charles J. Bullock, gives a history of the subject in the seventeenth century to date. If one wants to have a thorough knowledge of taxation in this State, here is something that will help.

Standard Lighting Schedules, 1917, all night and moon-light schedules, is the title of a pamphlet issued by the Electrical Review and Western Electrician. In addition to descriptive matter, it contains a broadside, which one can use after the manner of the tables issued by the Electrical World.

Readers' Guide Supplement, 1907-15, covers nine years and seventy-four periodicals, a very careful piece of work, which, together with the Readers' Guide itself, for the same period, covers nearly two hundred periodicals.

Heaton's Annual is in its thirteenth year, 1917, with the same subtitle, "*Commercial Handbook of Canada*." At the bottom of the outside cover it says, "See 'Where to Find It,' page 237." "Where to Find It" suggests Pitman's "Where to Look," and is a department which has been in one or more previous editions. This department is "a guide to dominion and provincial government reports and standard publications showing contents of interest to business men and travelers, investors and intending settlers and how to get them." Under "Water-powers" is the following: "Report Waterpowers of Canada; Report Waterpowers of Western Canada, Commission of Conservation, Ottawa; Report Waterpowers in Ontario, Hydro-electric Commission of Ontario, Toronto; write also Chief Hydraulic Engineer, Dept. Lands, Forests and Mines, Quebec; Sec. Dept. Industries and Immigration, Halifax, N. S., and Dept. Minister of Lands and Mines, Fredericton, N. B. Report of Commission for the Management of Running Waters, 1912, Dept. Co., Mines and Fisheries, Quebec; Water Powers of Canada, Water Power Branch, Dept. Interior, Ottawa; Water Resources; Papers—No. 7 (Manitoba Water Powers); No. 12 (Small Water Powers in Canada); No. 13 (Coquitlam-Buntzen Hydro-electric Development,) Water Power Branch, Dept. Interior, Ottawa."

"*Estimates of Population of the United States, 1910, 1911, 1912, 1913, 1914, 1915, and 1916, Including Results of the State Enumerations Made in 1915*," is Bulletin 133 of the Department of Commerce, Bureau of the Census. It is likely to prove particularly useful, and the tables on pages 39-46, dealing with the interdecennial enumerations taken under state control, will be serviceable.

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil Engineering

- 60 Handbook for architects and builders. Published under auspices of International Society of Architects, 1916. Chicago [c1916]. 432p. 6½x9½. *077.II6.1916
- 61 Mechanical equipment of buildings . . . L. A. Harding and A. C. Willard. Vol I: Heating and ventilation. First ed. New York, 1916. 615p, 6½x9½, illus. *072.H219.v.I
- 62 The building estimator's reference book. F. R. Walker. Chicago, 1915. 612p, 4½x7. *077.W152
- 63 Profile surveys in 1915 along Rio Grande, Pecos River and Mora River, N. M. U. S. Geological Survey. Water Supply Paper 421. Wash., 1916. 11p, 6x9, maps. W S I 421
- 64 Profile surveys in 1915 in Skagit River Basin, Wash. . . . U. S. Geological Survey. Water Supply Paper 419. Wash., 1916. 8p, 6x9, maps. W S I 419
- 65 The Navajo Country: a geographic and hydrographic reconnaissance of parts of Arizona, New Mexico and Utah. U. S. Geological Survey. Water Supply Paper 380. Wash., 1916. 219p, 6x9, illus, maps. W S I 380
- 66 Annual report of Dominion Water Power Branch, Department of Interior, Canada, fiscal year ending 3/31/15. Ottawa, 1916. 288p, 6½x10, illus., maps. *7203.1914-15
- 67 Facts about water power . . . (with analysis of "Merrill" report on electric power development, Senate Document 316, 64th Congress, 1st session, 1916). Prepared by . . . Water Power Development Association . . . 74p, 6x9. *0732.W381
- 68 The position of engineers towards the question of water power development in the West. H. S. Drinker. unpag., 6x9. *0732.D832
- 69 Fight for the nation's Niagaras. A. Chamberlain. [From *Boston Transcript*, 12/30/16.] *0732.C355
- 70 Waterworks handbook. Compiled by A. D. Flinn . . . R. S. Weston . . . C. L. Bogert . . . New York [c1916]. 824p, 6x9, illus. *073.F646
- 71 American Society for Testing Materials Standards, 1916. (Issued biennially.) 752p, 6x9½, illus. *6959.07.1916
- 72 Cotton warehouse construction. R. L. Nixon . . . U. S. Department of Agriculture, Bulletin No. 277. Wash., 1915. 38p, 6x9, illus. *6880.B277
- 73 Cotton warehouses: storage facilities now available in the South. R. L. Nixon . . . U. S. Department of Agriculture, Bulletin No. 216. 26p, 6x9, *6880.B216
- 74 Report of Chief of Engineers, U. S. Army, 1916; in three parts. Wash., 1916. *6831.1916.Pts. 1-3

(20) Electrical Engineering

- 75 Some properties of vibrating telephone diaphragms. A. E. Kennelly, 1916. (45p), 6x9. *0716.K391s
- 76 General Electric Co. . . . Handbook, 1917. 86p, 2½x5½, maps. *07.G286
- 77 Street lighting schedules for 1917. Electrical Review. Chicago [c1916]. unpag., 3½x6. *0711.El2er.1917

(30) Mechanical, (40) Mining Engineering

- 78 Practical safety methods and devices, manufacturing and engineering. G. A. Cowee. New York, 1916. 434p, 6x9½, illus. *072.C838
- 79 Operating details of gas producers. R. H. Fernald . . . U. S. Bureau of Mines, Bulletin 109. Wash., 1916. 74p, 6x9. *6876.B109
- 80 Combustion in the fuel bed of hand-fired furnaces . . . U. S. Bureau of Mines. Technical Paper 137. Wash., 1916. 76p, 6x9, illus. *6876.Tp137
- 81 Natural gas in 1915 . . . U. S. Geological Survey . . . Wash., 1916. (90p), 6x9. *6874.075ng.1915
- 82 Dry preparation of bituminous coal at Illinois mines. E. A. Holbrook. University of Illinois Engineering Experiment Station. Bulletin No. 88. June, 1916, Urbana. 133p, 6x9, illus. *075.II6d
- 83 Coke in 1915. C. E. Leshner. U. S. Geological Survey . . . Wash., 1916. (42p), 6x9. *6874.075ck.1915

(73) Sociology

- 84 Proceedings of Conference of Employment Managers' Association of Boston, Mass., held May 10, 1916 . . . U. S. Bureau of Labor Statistics. Bulletin 202. Wash., 1916. 64p, 6x9. *6899.B202
- 85 The British system of labor exchanges. B. Lasker . . . Bulletin of U. S. Bureau of Labor Statistics. Whole No. 206. Wash., 1916. 67p, 6x9. *6899.B206

(75) Financial, (76) Legal

- 86 Babson-Elliott year book, 1916 . . . National Quotation Bureau. Inc. New York [c1916]. vp, 4x7. *025.B64.1916
- 87 Practical rate making and appraisalment. W. D. Marks. South Hadley [c1914]. 269p, 5x7½. *025.M342
- 88 The philanthropic boards established by John D. Rockefeller. 38p, 4x6. *029.R59p
- 89 Practical working of the Mass. income tax. J. E. Perry. [c1917]. 24p, 5x7½. *0318.P429
- 90 The taxation of property and income in Mass. C. J. Bullock. [Reprinted from Quarterly Journal of Economics, 11/16.] 61p, 6x9. *1400.B876.0318
- 91 Law and regulations regarding special excise tax on corporations organized in the U. S. . . . Act of Sept. 8, 1916 . . . Treasury Department, U. S. Internal Revenue. Regulations No. 38. Wash., 1916. 12p, 6x9. *6825.R38

(77) Public Utilities and Municipal Ownership

- 92 Rules regulating the service of gas, electric and water utilities. Public Utilities Commission of State of Colorado. First issue effective Jan. 1, 1917. Denver, 1916. 39p, 6x9. *5504.0294
- 93 The J. G. White Manufacturing Corporation: striking example of public service efficiency. [From New York Commercial, 11/11/16.] *0231.N489w
- 94 Commission regulation of business, with particular reference to public utilities. L. R. Nash. 26p, 6½x10. *025.N17c
- 95 Report of committee appointed by City Council of Geneseo, Illinois, on investigation of 55 Middle Western municipal lighting plants. Municipal Ownership Publishing Co. nd. unsp, 6x9. *039.M92r
- 96 Data on municipal plant operation in Oklahoma . . . fiscal year 7/1/13 to 6/30/14. New York, 1916. 85p, 6x9. *4900.B716.039
- 97 The case against municipal ownership. F. G. R. Gordon. Haverhill, 1916. 56p, 6x9. *039.G654c

(80) Statistics

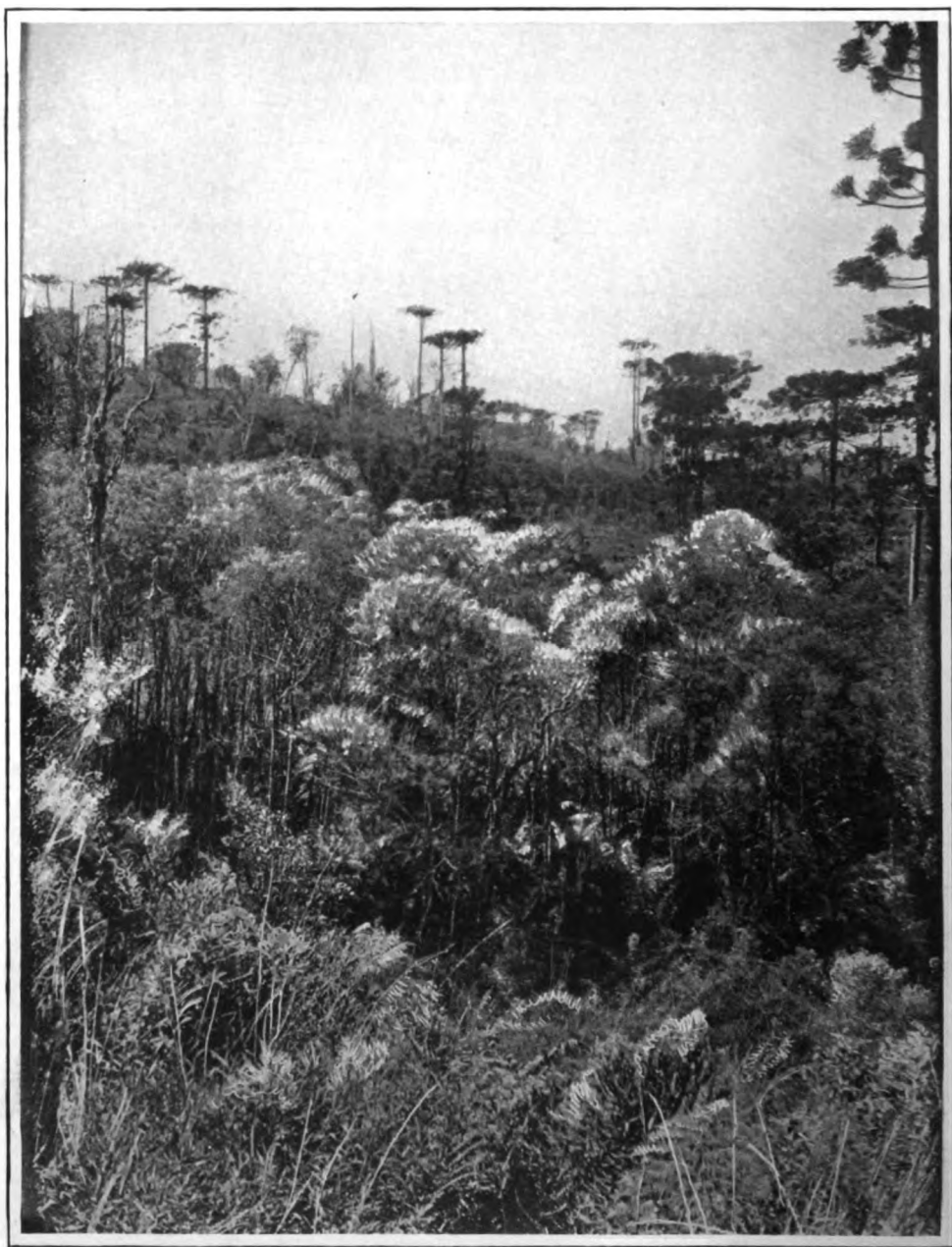
- 98 Estimates of population of U. S. in 1910, 1911, 1912, 1913, 1914, 1915, 1916, including results of State enumerations made in 1915. U. S. Bureau of Census. Wash., 1916. Bulletin 133. 46p, 9x11½. *6891.B133
- 99 Cotton production and distribution, 1915-16 . . . Bureau of Census. Wash., 1916. 99p, 9x11½, maps. *6891.B134
- 100 Statistics of railways, U. S., 1905-1915. Bureau of Railway Economics. Wash., 1916. 57p, 6x9. *022.B89st3
- 101 Facts about Georgia . . . Published under auspices of Georgia Chamber of Commerce . . . Atlanta, 1916. 277p, 7½x10½, illus. *3500.C35.02
- 102 Annual meteorological summary with comparative data, 1916, Boston, Mass. . . . Weather Bureau. 12p, 4½x9. *6881.B65.1916
- 103 Tenth biennial report of Bureau of Labor, Statistics and Factory Inspection, Wash. yrs. 1915-1916. Olympia, 1916. 312p, 6x9, illus. *6102.1915-16
- 104 Report on municipal finances for year ending 3/31/16 . . . statistics of cities and towns of Iowa. State Auditor. 294p, 6x9. *4200.F49. 1916

(90) Sources of Information

- 105 Readers' guide to periodical literature supplement, 1907-1915 . . . White Plains, 1916. 1252p, 7x10½. *096.R223s.1907-1915
- 106 Classified list of searches made in the library Jan., 1901 to Nov., 1916. American Society of Civil Engineers. [Reprinted from Transactions, Vol. LXXX, p. 2086.] (1916) (43p), 6x9. *6932.096s
- 107 List of American doctoral dissertations . . . 1915. Wash., 1916. 160p, 6x9. *6808.096 am.1915
- 108 Books on business in general, accountancy, banking and finance. In Library of Stone & Webster. Jan., 1917. 7 typewritten sheets, 8x10½. *601.096bu.
- 109 Select list of references on welfare work for laborers. Library of Congress . . . Typewritten sheets, 9x12. *6808.096we
Supplementary list of same. *6808.096wel
- 110 List of recent references on industrial insurance. Library of Congress . . . Typewritten sheets, 9x12, *6808.096ins
- 111 Commercial travellers in Latin America. Department of Commerce, Bureau of Foreign and Domestic Commerce . . . Tariff Series No. 35 . . . Oct., 1916. Wash., 1916. 42p, 6x9. *6890.C73ct
- 112 Books and magazine articles on Latin America . . . Wash., 1914. 136p, 6x9½. *6802.096su2
- 113 Latin American history and description in Columbus Memorial Library . . . Wash., 1909. 34p, 6x9½. *6802.096sul
- 114 List of Latin American history . . . International Bureau of American Republics. Wash., 1907. 98p, 6x9. *6802.096
- 115 Heaton's annual: the commercial handbook of Canada . . . 1917. Toronto [c1917]. 516p, 5x7½. *7200.09.1917
- 116 Directory of War Relief Funds. Boston Transcript. 1p. *093.W195
- 117 Publications issued by Library of Congress since 1897. Jan., 1917. Wash., 1916. 50p, 5½x8. *6808.096.1917
- 118 Year book, 1916. Merchants Association of New York. 269p, 7x10. *1791.M53.1916

Miscellaneous

- 119 The future of the railroads . . . R. W. Babson. [c1914] 128p, 5½x7½. *022.B11
- 120 The first steps in algebra. G. A. Wentworth. Boston, 1894. 194p, 5x7½. *132.W488f
- 121 America and the new epoch. C. P. Steinmetz. New York [c1916]. 229p, 5x7½. *029.St36
- 122 A country with an opportunity. F. A. Vanderlip. 1916. 23p, 6x9. *029.V284



FOREST IN THE STATE OF PARANA, BRAZIL.

STONE & WEBSTER JOURNAL

MARCH, 1917

EDITORIAL COMMENT

Mr. G. S. Beeby, the New South Wales Minister of Labor, and once a leading light in the Labor Party, recently made a speech in which he pictured a grave peril from labor monopoly. He said, among other things: "We have heard a great deal in the past of the danger of a capitalist monopoly; but we are beginning to learn that labor monopoly, particularly where it is used for political purposes, is, if anything, a far greater menace to the community. If a body of men obtain a distinct monopoly of work in an industry, and in defiance of conciliatory laws, suddenly hold up the community, and refuse to submit its claims to the tribunal provided, the action is just as dangerous as that of a syndicate which corners foodstuffs for the purpose of extracting unfair profits from the community. This becomes more marked where the new policy of 'direct action' permeates a section of the industrial world. The present industrial laws have undoubtedly failed to give us any measure of industrial peace. Taken as a whole, industrial difficulties have been more numerous and more acute since the adoption of our revised arbitration laws. We have to face one of two alternatives: Either repeal the laws altogether and let conditions adjust themselves, as in the old days in the open market, or make another attempt to create a system which will save us from the ever-increasing stoppages. I have for a long time been of opinion that in the end we will be forced to repeal the greater portion of the law as it stands." Mr. Beeby also makes the pertinent comment that labor troubles lower production, which in turn necessarily reduces the standard of living. Coming from Australia this is significant.

The President and the "Pork Barrel"

President Wilson is reported as announcing that during the remainder of his administration he will veto any bill containing an unwarranted appropriation of the government's money. He is said to have told various members of Congress that he will countenance no bills so indefensible as the \$38,000,000 omnibus public buildings measure which was passed by the House at the last session, but which failed of passage by the Senate. Several months ago we had something to say about the scandalous nature of this bill and in particular called attention to the great number of appropriations ranging from \$50,000 to \$100,000 which were proposed for post office buildings in towns of 300 to 1,000 population.

The president is entitled to the highest commendation for this step. The "pork barrel" has been growing steadily heavier for the last fifteen years. From the way Congress has legislated one might suppose that the primary function of this government is to tax everybody as much as possible and divide the proceeds pro rata among the different congressional districts. It had begun to look, in short, as if the government had frankly adopted the view that it was here for the purpose of decorating the hamlets of this nation. Any community of 300 people might infer that it had the right to demand of Uncle Sam a neat building costing \$75,000 or \$100,000, though the postal needs of such a community might call for nothing more than a structure costing a few hundreds of dollars. Indeed, there are communities in this land where the mail is received, sorted, and delivered in practically the post mistress' kitchen. It does not occur to anyone that a little thrift in such matters would be a good thing for Uncle Sam.

The trouble has been in the past that the "pork barrels" have always included some good things along with many bad, and in order to have the good things it was necessary to take the bad. This of course is a senseless procedure, but as the president has not had the right to veto separate items in a bill he has often felt obliged to sign measures that were repugnant to him. If there is one thing more than another which the president of the United States needs, it is the right to veto individual items in appropriation bills. The demand for an amendment of the Constitution to this end has been increasing of late years, and it may not be long before this change is regarded as an absolute necessity.

The "pork barrel" has not only squandered the resources of this nation but has also had a demoralizing effect upon senators and representatives in Congress. Anything that will lessen the efficiency of senators and representatives as commercial agents for the states and districts which they represent will be a godsend to the people of the United States as a whole.

Where Delay Is Dangerous

The world is facing one of the greatest economic problems, if not the greatest, that has ever confronted it. The belligerent European nations have since August 1, 1914, spent about \$75,000,000,000 on the war, and the war has also occasional large additional expenditures by neutral governments. The interest on the debt so far contracted is within measurable distance of the total annual budgets of the leading nations before the war. Taxation has become a nightmare to everybody in Europe.

For two years and a half we have congratulated ourselves on the fact that we have escaped this fate. The events of the last two months have, however, rendered our feeling less secure. Yet even if we keep out of the war we shall have enough to worry about in the matter of taxation. In fact, taxation has been a sore point with us for some time past. It has been taking more from productive industry than is good for the nation. It is keeping the wealth of the nation from increasing as fast as it should, as fast as the rising standard of living necessitates. This is bad enough, but on top of it comes the fact that the enormous load of taxation which Europe has foisted upon itself will, unless we exercise extraordinary care, react powerfully on our industries.

We have grown enormously rich during the war and have a great deal of money to spare. When the war is over we shall, however, lose a great deal of the business that has produced this excess wealth. The hope of everyone is that we may keep part of the business, or in any event do as large a trade with foreign countries as we did before the outbreak of hostilities. There is good reason for believing that we may accomplish this if we act prudently. But there is danger that we shall come far short of our expectations if we fail to overhaul our conditions and adjust them to the greatest transformation in the economic status of the world of which we have any record.

The cry in Europe for many years will be "produce more

and consume less." That is, every nation will feel itself under the necessity of enlarging its export trade and diminishing its import trade as much as possible. Taking the world as a whole, exports and imports must balance. This is a fundamental principle of commerce, but each nation will probably hope that it at least can export more and import less—in other words, that it will be more fortunate than its neighbors. Anyhow, the attempt of the various nations to evade this principle is quite likely to bring about many readjustments of our trade conditions. The aim of European producers will be to compete sharply with our producers both in the American market and in all other markets, while the aim of European governments will be to keep down as much as possible the consumption of our wares. Not that there will necessarily be any avowed discrimination against this country, but necessity will, nevertheless, impel Europe to pursue the policy we have indicated.

Everyone is talking of military preparedness today, but there is as keen a need of considering the question of economic preparedness. The efficiency of both capital and labor must be increased. Capital must be allowed to adhere more strictly to economic law, and labor must be brought to a better understanding of its need of complying with this law. Today law and public opinion are forcing capital to do things which it knows are in direct violation of economic law and which must, in the end, result not only in its own discomfiture but in that also of every man, woman and child in the United States. Labor has failed to consider adequately its duty under economic law and too often public opinion has upheld it in this negligence. The time is coming, in fact is practically here, when the efficiency of everyone under economic law will have to be carried to the highest point if we are going to occupy relatively the same industrial position that was ours before the war.

The crying need with us is to restrain extravagance. Too much of the income of this country is going for unproductive purposes. The people's surplus, which should be devoted to industrial ends, is being taken in larger and larger measure by government in the form of taxation and employed wastefully. The man on a salary or a wage has been finding it harder and harder to own a house, to say nothing of laying by anything for his old age. The money which he would put into a house or which he would have put into a bank or some form of investment against his old age has been taken by the government

and spent in ways that are abhorrent to a prudent mind.

The cost of government alone is shocking. A very considerable portion of the money raised by taxation for that purpose is squandered as effectually as if it were dumped into the ocean. Payrolls are magnified to carry on work which could be just as effectively carried on by a very much smaller number of people if they were all working intelligently and honestly; public improvements are made which are wholly in the nature of luxuries and which no prudent person with relatively the same income would think for a moment of allowing himself; all sorts of things have been provided which were beyond the needs of the community, that is, if we assume that it is right and proper that the members of the community shall be allowed to save money to be used in increasing productive activity. This characterizes every form of our political life, municipal, state, and federal. The federal government employs a great many more people than are necessary to do its work if everyone works as a self-respecting person should work. It dredges rivers that never ought to be dredged; it builds post office and other public buildings that never ought to be built; it employs utilities that never ought to be employed; and it taxes the people accordingly. A good part of the money which it raises by taxation should be left to swell the supply of working capital of industry. We are continually congratulating ourselves that the wealth of the nation is increasing so fast. Yet it does not increase nearly so fast as it ought. So much for the inefficiency of capital, the responsibility for which does not rest wholly or perhaps in largest measure upon capital itself but upon government and public opinion.

The inefficiency of labor is equally glaring. Labor is continually demanding a larger return and for a good many years past has been getting it. Its gain has been relatively larger than the gain of capital. As a result, the initiative of capital has been impaired. It is not doing the work it ought to do and might do, and this of course tends to diminish the rate of increase in the annual production of wealth. The annual wealth of the United States is distributed among more than 100,000,000 people. It is what they have to live on during the year, and people as a whole live better or worse as the annual production of wealth is greater or less. The aim of everyone should be, therefore, to increase the wealth of the country as much as possible, for that increases the fund out of which his dividend is being

paid. The question of how to increase the efficiency of labor has been widely discussed in recent years, and yet there is a shrewd suspicion that the efficiency of labor, instead of being increased, has been decreased. Production has perhaps been increased, but not at the rate it should have been. Every new labor-saving device tends to increase production, but if the labor released by this device is employed with less diligence than before, the net gain is much less than it rightly should be. In other words, though production may increase, the increase is less than might and should be expected. Now the important need is this: Europe during the last three years has been increasing the efficiency both of her capital and labor employed in industry much faster than ever before, and if we are going to compete successfully with her after the war, we shall have to take steps to insure the same end. Capital will have to have relief from taxation, from repressive legislation, from ill directed public regulation. Labor will have to be more efficient, less disposed to block the wheels of industry by strikes and threats of strikes, and malingering. This is economic preparedness and the country needs it badly. If industry is allowed to adjust itself to the known principles of political economy, and if labor can be brought to see that its aim should be to speed up industry rather than slow it up, this country can calmly face all that the future has in store.

CENTRALIZATION OF GAS PRODUCTION

BY C. W. HUNTER

The economy of concentrating the production of several smaller plants into one large unit has long been recognized by the gas industry and, since the advent of high pressure transmission in 1899, this plan has been adopted in a number of instances to include plants many miles apart. However, if the petroleum situation in this country continues to develop in the manner indicated in the past few years, the number of situations where a saving can be effected by centralization of production will be greatly increased. This is due to the increased cost of water gas corresponding to advancing oil prices and the consequent return to favor of the coal gas process.

It is possible to make gas of a quality suitable to be distributed by public utilities, by several different processes, the choice of which will be the most advisable depending to a great extent on the supply of raw materials available. The process of distilling gas from coal was originated by Murdock, in England, in 1807 and, on account of the large quantity of gas coal available, in Europe, practically all of the city gas is of this type. In 1872 the method of making an illuminating and heating gas by the use of anthracite and oil was perfected by Professor Lowe of the University of Pennsylvania and, on account of the large oil fields and anthracite deposits in this country, this process rapidly grew in favor, especially as it was found possible to adapt to gas making a fraction of the crude petroleum for which previously little use could be found. In recent years, however, two causes have combined to reduce the available supply of gas oil; first, the enormously increased demand for gasoline for automobiles and fuel oil for oil-burning stationary steam plants, locomotives, etc.; second, the invention of methods by which a very much greater percentage of the crude petroleum can be converted directly into gasoline without the production of the "gas oil" fraction. Under the pressure of these conditions (assisted materially, in all probability, by various others), a great advance in the price of the oil formerly used for water gas production has taken place. A large proportion of the cost of manufacturing water gas is represented by the oil, the second largest item being fuel expense and, as a consequence of higher prices for the raw mater-

ials, water gas costs have gone up from 30% to 50%, and many companies are looking around for other means of meeting their demand.

On the other hand, the largest item in producing coal gas is coal. There are large deposits of coal suitable for this purpose fairly well distributed over the United States, most of the mines being owned by individual interests. It would seem reasonable to believe, therefore, in spite of the excessive prices of the moment, that when the present war demand has subsided, the costs will return to somewhere near normal and that, in general, gas coal prices will not be subject to as many fluctuations as the prices of gas oil. Furthermore, the company operating a coal gas plant recovers a large percentage of the coal as coke which is sold as a domestic and metallurgical fuel, its price varying with the cost of coal in the same locality. Any increase in the cost of coal, therefore, is to a large extent or entirely offset by increased returns from the coke sales.

For the reasons mentioned and also on account of the gradual abandonment of the old candle power standard, for the past few years there has been an increasing tendency for the gas companies in many parts of the country to convert their process of manufacture from water to coal gas. In 1904 there was practically 2.5 times as much water gas produced in this country as coal gas; in 1914 the ratio was about 1.1 and at the present rate it will not be long before water gas is decidedly in the minority. This general change in the process of gas generation should cause a decided increase in the number of situations where a saving can be shown by combining isolated plants, on account of the large reduction of the unit investment and operating costs which can be effected in a carbonizing plant as its size increases.

There is no radical difference in the design of the large water gas sets of 2,500,000 feet or more daily capacity and of small and medium size sets of from 500,000 to 1,500,000 feet capacity. In spite of the fact that oil and fuel constitute the principal items of cost, the larger sets can show little or no gain in efficiency over smaller sets in the consumption of these two materials. About the only economy due to increase in size of generating units is the saving in labor and fixed charges on investment, which are relatively small. Therefore, unless the situation presents a local advantage (for instance, by reason of ability to place the central plant on tidewater), very little

economy is gained in water gas production by enlarging the size of the producing unit through the method of combining small plants into a central station, and delivering the gas under high pressure.

With carbonizing plants, conditions are entirely different. Next to the cost of the coal, the largest operating expense is labor, on account of the large volume of coal and coke that must be handled. As the plant increases in size, radical changes in design take place which result in considerable increases in economy.

Let us take for comparison four installations having respectively a daily capacity of 50,000, 1,000,000, 4,000,000 and 7,000,000 cubic feet of gas. In the first, a horizontal retort setting would probably be adopted; in a plant of this size neither the cost of equipment to handle coal and coke nor to recover ammonia would be justified. For the million foot unit the most modern installation would be a vertical retort setting which not only makes use of the force of gravity to charge the coal into and discharge the coke out of the retorts, but also would have complete conveying equipment. Where the horizontal retorts would be restricted to a unit charge of 300 to 400 pounds per retort, the verticals will hold 1,700 to 2,100 pounds. Furthermore, the quality and quantity of residuals recovered will be increased, on account of the change in design.

For a plant to produce 4,000,000 feet a day, a still greater development is carried out. In the average case when there exists an adequate market for the coke made, such a plant should consist of by-product coke ovens of the surplus gas type in which the heat required to carbonize the coal is furnished by burning part of the gas. In the oven plant the unit charge might be $14\frac{1}{2}$ net tons of coal per oven. The size and shape of the chambers for containing the coal is entirely different from the retorts, although the principle of the carbonizing process is unaltered. The coal is charged into the ovens by gravity from the top, but a return is made to the horizontal position for discharging, on account of the structural difficulties that are encountered in endeavoring to discharge vertically this large mass of hot coke. A large decrease in labor and a considerable gain in the quantity and quality of the coke is obtained by this increase in the size of carbonizing units. For the 7,000,000 feet plant practically the same design as the 4,000,000 would be retained except that, in many cases it would be found advisable to use pro-

ducer-fired ovens in which part of the coke would be used to generate the heat required for carbonization, instead of part of the gas, as in the previous installation. Naturally, the relative value of coke and gas at any particular location will be the important factor in deciding which of the two types are to be adopted.

It is very difficult to illustrate the increases in economy effected through the growth of the size of carbonizing plant by general figures because, not only does the cost of gas coal vary in different localities but also the cost of gas is affected to a great extent by the prices received for coke and other by-products, which depend directly on the available market. The following figures indicate a comparison of efficiencies that might apply to one locality in this country:

Type of Plant	Horizontal Retorts	Vertical Retorts	Surplus Gas Coke Ovens	Producer-Fired Coke Ovens
Plant capacity per day.	50,000 ft.	1,000,000	4,000,000	7,000,000
Production expense less coal per net ton of coal.	\$2.50	\$1.60	\$0.80	\$0.85
Fixed charges per net ton of coal.	\$1.80	\$1.70	\$0.55	\$0.65
Value of products per net ton, f.o.b. plant.	\$5.01	\$6.31	\$6.40	\$6.70

The products included in these figures are gas, coke, tar and ammonia, and their values f. o. b. plant are assumed. Other items of cost such as gas coal, management, taxes, etc., are omitted for obvious reasons; none of them, however, show to the disadvantage of the larger plants.

The above comparison shows the striking decrease in operating expense and fixed charges which parallels the increase in size of the plant, and, in a smaller degree, the net income is enlarged by the added quantity and quality of products from the large units.

It may be questioned why the coke oven type of carbonizing unit is not adopted in small plants by reducing the number of ovens. This is not practicable under the state laws setting a minimum heating or illuminating value on the gas that may be distributed by utilities. The gas given off from the charge of coal during the first few hours it is in the retort or oven, is

higher in quality than the usual standard required, while that evolved near the end of the operation, is lower. These variations in quality are evened out by using a considerable number of units operated in such a way that the charging and discharging of them occurs at regular and short intervals. It is obvious that the necessary frequency cannot be attained with a small number of units. With a few large units in a small plant, the company would be constantly in danger of distributing gas of a quality below the standard required. Furthermore, the unit investment and conversion costs of an oven plant of 40 or 50 ovens, obviously would not be applicable to one of five or ten units.

Offsetting in part the economies due to centralization of coal gas production is the necessity of paying the fixed charges on investment in transmission mains and the pumping and operating expenses of distributing the gas from the central plant to the outlying holders. Many other features of each situation must be examined before it can be determined whether the advantages or disadvantages of concentrating the production predominate. Undoubtedly, however, the opportunities for building up systems supplying a number of communities from a central station, are much increased by the development of the coal gas process.

AMBULANCE EXPERIENCES IN FRANCE*

In February, 1916, I left the Paul Revere Trust Company, owing to its consolidation with the State Street Trust Company, and having always been very anxious to see something of the European war, I considered it a very good opportunity to start out. I sailed for Bordeaux on the *Touraine*, a French line steamer, which was twenty-seven years old and had been condemned for service before the war. The people on board were mostly buyers for New York milliners and ambulance men and men connected with the government service of various kinds. Of course, the passenger list was very small. We were allowed to take, but not to give, wireless messages, as giving them would have indicated the position of the ship. We had a very rough passage across and were blown out of our course several hundred miles, so that at one time we were only one hundred miles from the Azore Islands. On reaching the French coast, all the passengers were subjected to life-belt drill and assigned to life boats in case of emergency. We went into the river at Bordeaux under cover of darkness, with all the lights extinguished wherever possible and blinds over the port holes.

Bordeaux is a very dirty, poor, shipping city, which at that time was suffering from enormous freight congestion, due to lack of men to move the incoming freight. All the wharves and the quays were stocked high with merchandise of all descriptions. German prisoners were to be seen working on the banks of the river. We had little or no difficulty in landing. Our passports were vised by the *Prefecture de Police* and we were allowed to take the first train to Paris. The train service from Bordeaux to Paris was good. All the train officials with exception of the engineer are women, including the waitresses in the dining car, conductors, and all the train crew. The trolley cars in Bordeaux were operated by women. The first great impression we had was seeing everyone in uniform. After an eight-hour trip on a good train passing through the famous vineyards of southern France and chateau country, we arrived in Paris on time, and were conveyed by a breakneck taxi through pitch-dark streets to our hotel.

In Paris, one was impressed by a combination of gay and sombre atmosphere, the uniforms giving the city a very gay and festive appearance, while the women were all in mourning,

*The writer is now a member of the Stone & Webster Securities Dept.



A GROUP OF SLIGHTLY WOUNDED WAITING TO BE EVACUATED

which, of course, lent a saddening influence. Someone has asked if the women were as sad as they looked—well, it depends on the women. The shops looked about the same as usual, with, perhaps, not as much display, while the service was not as good due to the absence of the men. At that time there were no motorbuses in Paris, but now these have been replaced by new ones which are much better than the old.

I may say here that when in Paris later, I had an opportunity to see General Gallieni, who has since died. I was impressed by his fine soldierly appearance; his air was one that bred confidence. He seemed very much of a popular hero, judging from the way he was acclaimed by the public.

I went right to the headquarters of the service, and had to be equipped with a uniform and the various other things needed, and received instructions. At that time they needed men at the front very badly, so we were sent out at the end of six days, which is very unusual. Three of us left Paris in a convoy of new ambulances going to Section 2 with a French *convoyeur*. Our destination was a little vague; though they knew the section was in the Verdun Sector they were not sure of the exact location. The trip was an extremely interesting one, as we followed the course of the old battlefield of the Marne, passing through Meaux, Montmirail, Vitry le Francois, St. Diziers and Bar le Duc. Along both sides of the road at odd intervals, and in extraordinary places, were isolated clusters of graves, with nothing but wooden crosses and small metal tags to indicate the occupant.

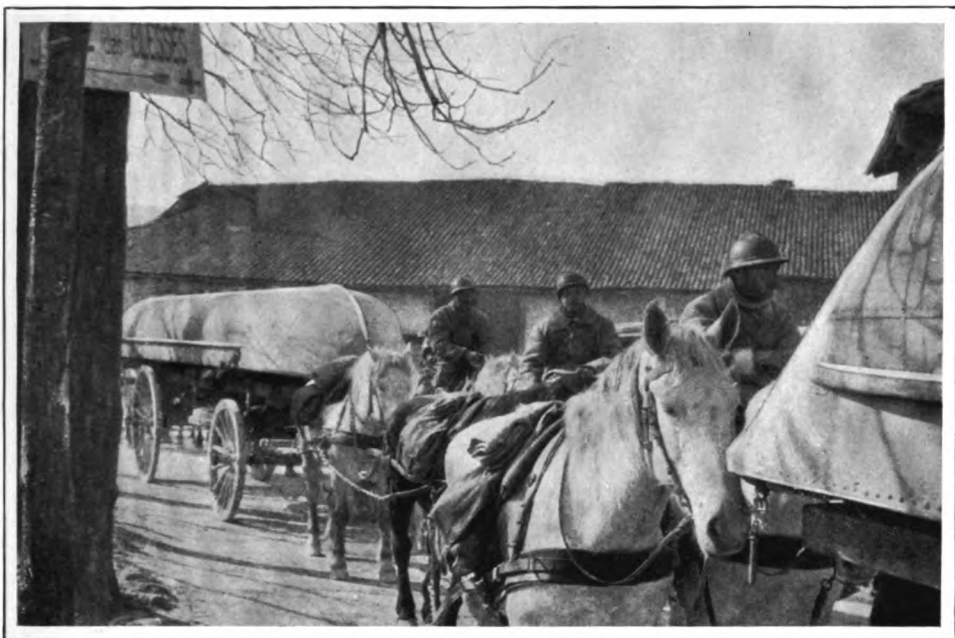
Some of the towns were badly battered by shell fire. These, however, were the exception, as this battle was more a cavalry and infantry affair than an artillery duel, unlike the battles of today. At Bar le Duc, we were informed that Section 2 had moved somewhere south of Verdun on the Meuse river, but they did not know the exact locality. We then proceeded to S——, the staff headquarters of the army. The Verdun attack had just begun, about the first of March, and the turmoil was at its height. Troops and supplies were being hurried to the lines in order to check the German advance. As the French at that time had no railroad communications, all this movement had to be carried on by automobile trucks and supply wagons. The traffic congestion, therefore, was something beyond belief. It was estimated that on any one given point on the main road between Bar le Duc and Verdun 25,000 automobile trucks

passed every twenty-four hours. The side roads were maintained for horse-drawn vehicles, but the civilians, driven from their homes, were forced to pick their way along the sides of these congested roads as best they could. Old men bearing heavy burdens and young girls tired to the breaking point from exhaustion, trudged along on the sides of these muddy roads continually spattered by the heavy munition wagons going by.

On arriving at S——, we were fortunate in finding a driver of one of our ambulances who indicated the road to our post. Here we found the Americans attached to one of the front line hospitals, and everyone was being worked to the limit. The hospital was an old chateau on the banks of the Meuse which, with its grounds, were surrounded by a high mediaeval wall. The chateau itself was a dressing station for men brought in from the trenches. Our sleeping quarters were on the second floor of a barn in the chateau grounds, the first floor being occupied by the coffin maker, who plied his trade all night. Rats, vermin, and very little air added to the unpleasantness of these quarters. Our kitchen was in an old farmhouse, a retainer's building of the chateau. The kitchen itself was typical of the French peasants of the district, with a stone flooring covered with about half an inch of muddy ooze, and a door which opened immediately into the stables. When we first arrived, the civilian occupants of the building had not yet been evacuated by the military authorities, so when we sat down at table, we had to eject fighting dogs and children out from under our legs. Our food, consisting of fried meat and fried rice, was bad as the supplies were not regular.

We were situated between the towns of W—— and A——, at which points were important bridges crossing the Meuse. These were constantly subjected to the fire of heavy German artillery, and in order to leave the chateau in either direction we had to pass through these towns. Fortunately none of us received any wounds, neither were our cars disabled, other than by falling into large shell holes at night, but, thanks to the lightness of the Ford ambulances, when such an accident occurred they were easily extracted. The wounded at that time were coming in in great numbers, so that our men were forced to work on twenty-four hour shifts. Heavy traffic and snow on the ground made travelling very difficult.

The night I arrived in the town of P——, which was my first introduction to the sounds of battle, was most im-



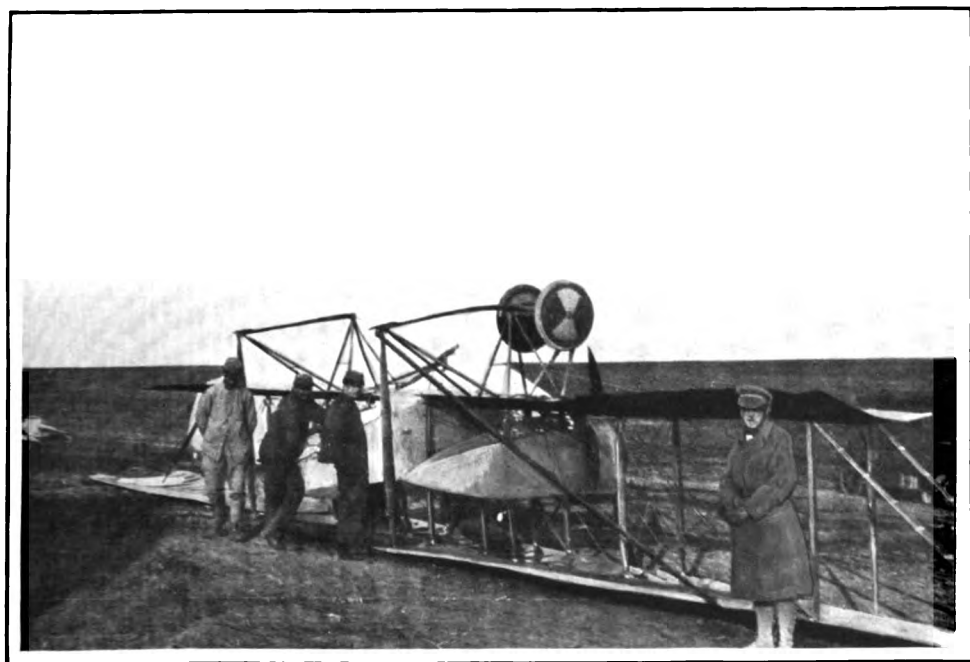
A PONTOON TRAIN ON THE MARCH



FRENCH SOLDIERS IN A SMALL VILLAGE BEHIND THE LINES



A HAND VEHICLE IN COMMON USE FOR TRANSPORTING WOUNDED
 The loaded stretcher is underslung.



A CAUDRON COME TO GRIEF

pressive. I remember being very annoyed with one of my friends who insisted on talking, because I wished to give my undivided attention to the noise of battle. Of course, like everyone else, I soon adapted myself to my surroundings and life at the front became as normal as it ever had been anywhere else. It is an erroneous impression that any one ever gets used to shell fire; for although one becomes fatalistic in his views, the noise of the explosion cannot help acting on one's nerves. The first shell which exploded near me amused me greatly at the moment, and yet I was scared blue when I had to return over the same road.

We stayed at P—— about two weeks and then moved on to V——, where we were again attached to a hospital. The accommodations here were much better than they were at P——. By this time the French were getting in better shape to meet this German onrush and order gradually resolved itself out of chaos, particularly in the handling of the wounded. There was a large aviation field here, which contained some of the five hundred planes which originally guarded the road between Bar le Duc and Verdun. Some of the American aviators landed here and visited us, some of whom have since been killed. We were in this position about three months and then were ordered to Bar le Duc, about the first of June, to take up a quiet service there and to do much needed repairing upon our cars and equipment. But, as it turned out, we there had to undertake one of our hardest tasks. On the first of June, 1916, the Germans made their second bombardment of the city by aeroplane and continued this form of amusement for several days, with the result that many of the civilian population were killed and much property damage done.

I was at Bar le Duc about a month and was then recalled to Paris. While working in headquarters in Paris, I was sent at one time to Bordeaux to look after the shipment of cars coming in from America. The chassis are crated and the parts have to be assembled on the docks at Bordeaux. A temporary wooden body is then made from the boxes in which the chassis arrive, and in this way they are run over the road to Paris. A well-known body maker in Paris then puts on the ambulance body.

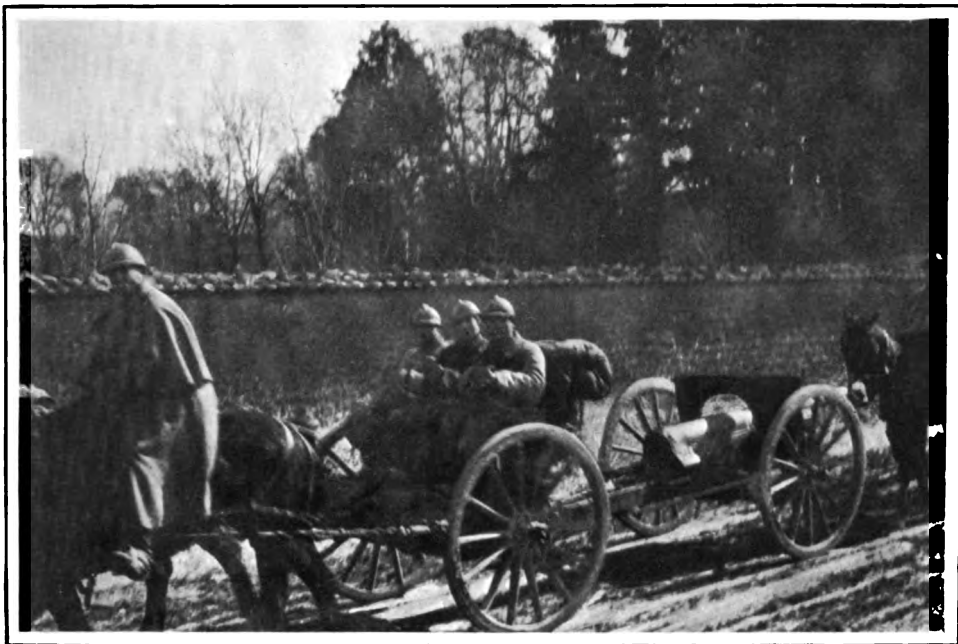
On August 15 I was given charge, as director, of Section 9, which had been offered anonymously to the American Ambulance Corps as a debt of gratitude to France. We received orders

to take our position in the Vosges mountains of Alsace. This sector was then very quiet, as the French and German armies were at a deadlock, but the difficulties of ambulance driving were even greater than those which we had encountered at Verdun. To get to our posts in the mountains, we had to climb prodigious grades, running along the edge of steep declivities and around very bad corners. In wet and snow, the men were in constant danger of going over the edge, but fortunately no fatal accidents occurred.

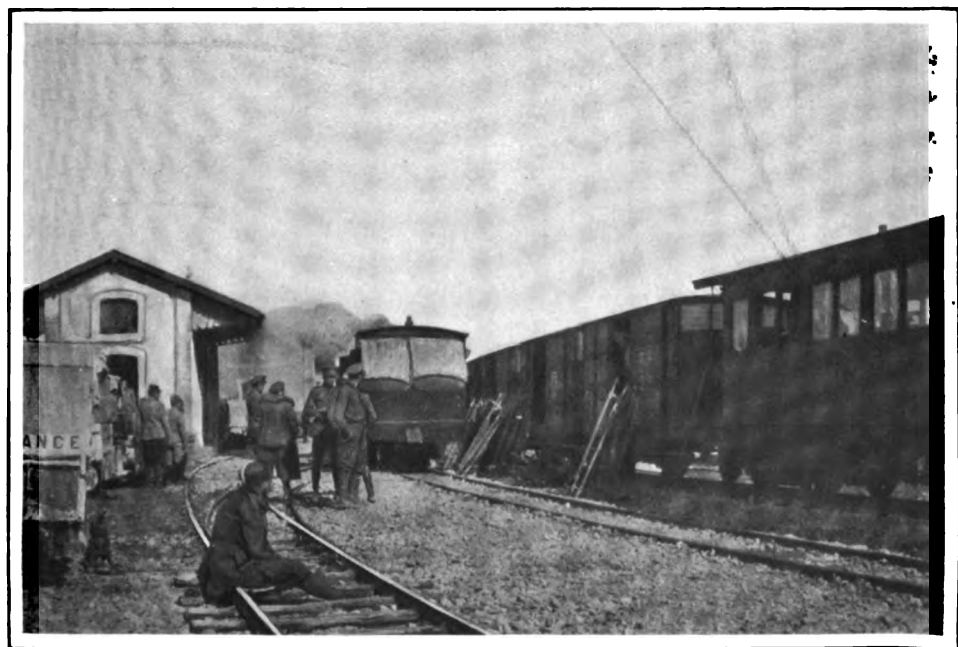
The Alsacians today are neither German nor French, as they speak German but of course sympathize with the French. Like most of the people on the battle front, their one great anxiety is to know when this war is going to end. All of the Alsatian men who have volunteered for French service have been put into colonial regiments, as otherwise, if captured by the Germans, they would be shot as traitors. In this locality, therefore, one sees many men in civilian clothes, and industrial and agricultural conditions are accordingly much better than in other portions of the country. Snow makes its appearance very early in the mountains, so that man's worst enemy in this sector is the elements. Battle conditions are almost impossible.

Early in December, we were ordered out of this army and into another and again we found ourselves in the Verdun sector. This time our section was attached to a division which was then holding an important position before Verdun. Our quarters were immediately outside the city and we had an exceptional opportunity to follow in an intimate way the December activities of the French troops. The 12,000 prisoners whom the French took on the Cote du Poivre were quartered for several days, before they could be moved, in our immediate vicinity. These men, dirty and bedraggled as a result of coming out of the trenches were not an inspiring looking group. The report that the German infantry has deteriorated is undoubtedly true, if these men can be accepted as an example. It was my good fortune to have the opportunity to converse with one of the prisoners, who spoke excellent English, having lived twelve years in New York. He assured me that the morale of the German troops was good and that the worst outcome of this war for the Germans would be a draw. Of course this was immediately after the Germans had made their successful march through Roumania.

The post which we served at that time was on the right bank of the river at M——. The wounded were being brought



THE FAMOUS "75" ON THE WAY TO ACTION



RED CROSS TRAIN AT A RAILROAD IN THE VERDUN SECTOR

down by canal boat and deposited there. At that point they were loaded in our cars and transported well out of range of the guns to the rear. While at the post our men used as shelter the cabin of a canal boat. There had been two unoccupied canal boats, but one of them had just been sunk by a German shell. The work during this period was excessively heavy, due as much to heavy frosts as to cold steel. The French negro troops especially suffered with frozen feet and had all to be retired to the rear.

From M—— we occasionally got men so seriously wounded that they could not travel far and these were always sent to the *Palais de Justice* in the citadel at Verdun. Here the hospital consisted of one underground operating room. The entrance, stacked on all sides with sand bags, was narrow and difficult. Passing through a long arched passageway, one came into the operating room. The operating table was in the center of the room, and over it hung one oil lamp. The patients were lying on their stretchers around all sides of the room and the operation on their comrade was carried on before their eyes. I remember entering upon this scene one early morning when the doctors were in the act of amputating a man's leg. Whether the anaesthetics were insufficient or whether it was merely nervous reaction on the part of the patient, the surgeons were having great difficulty in holding their patient upon the table. He was writhing to and fro and uttering fiendish cries. Meanwhile, the freshly wounded were being brought in and in their semi-conscious state were allowed to realize that it would be their turn next. In my healthy condition it was almost more than I could bear, but for those men who realized that soon they would have to undergo the same treatment it must have been torture.

The city of Verdun, as it stood in January, 1917, was badly damaged by fire and shell, but was by no means obliterated. The cathedral on the citadel still stands in almost perfect condition, but there is scarcely another building in the town which does not boast at least one shell hole. The civilian population have long since departed, but there are many troops quartered in the town. These live in the cellars of the once splendid residences and it is an amusing spectacle to walk down the street and see the smoking chimneys of stove pipe emerging from the sidewalk. The church service has been resumed in the cathedral on Sundays. The city in its humble picturesqueness stands today as a wonderful monument of French valor and resourcefulness.

We left the Verdun sector early in January, 1917, for a much needed rest in a quieter sector. At T——, I found my opportunity to leave and return to America. The homeward trip on the *Espagne* was uneventful for us, although we heard through the wireless that Mr. Wilson had broken off diplomatic relations with Germany. The passenger list was smaller than was expected, as fifteen persons cancelled their passage on the report that two coal steamers had been sunk the day previous to our departure in the Bay of Biscay.

This hasty and superficial sketch of a year's service in the Ambulance Corps does not even attempt to touch on some of the greatest influences which surround the American volunteer who devotes himself to this work. The personal equation, for example, is almost entirely lacking in this article, though undoubtedly a whole volume could be written on the inspiring effect of working with such people as the French, under such trying circumstances. Everywhere one meets nothing but sincere sympathy and appreciation, coupled with an indomitable cheerfulness, which combine to transform the hardest work into a pleasure and to make drudgery almost negligible.

In conclusion I wish to say that over here it is impossible to acquire any conception of the human energy which is daily being expended in this war. This energy is represented by all the resources of the nation and the loss of human life is only a part of the general economic waste. If one could picture the acres and acres of barbed wire entanglements, the endless miles of communicating trenches, and the magnitude of first, second and third line fortifications, he would appreciate in some measure the duties of the engineer corps. Again, one would have to picture an endless flow of automobiles of all makes and sizes from the heaviest tractor to the lightest staff car and one would have to visit the many automobile repair *parcs*, to form any conception of the extent and magnitude of the automobile service. So, too, one should see a battery of 75's in action, or watch some big monster on a freight car belching forth its cumbrous load and then disappearing down the track on its recoil, to understand the use of modern artillery. Watching the manoeuvres of the world's fastest aeroplanes, which, on clear days, may be seen to come and go from their respective aviation fields like so many bees from their hives, helps one to feel more than ever what a crime it is that all this human energy is not being turned into productive channels instead of being



Above
A LOADED FORD
AMBULANCE
READY TO START



Below
PUTTING THE
WOUNDED ON A
RED CROSS TRAIN

used solely as a destructive force. If we could mobilize our nation's efforts and resources in times of peace as effectively as we should have to do in order to wage successfully a modern war, I am sure that such tasks as the construction of a Panama canal would become the merest incident.

IMPRESSIONS OF THE PUGET SOUND COUNTRY

BY EDWIN S. WEBSTER

Some of the members of our organization, recalling that I was in the Puget Sound Country for a short time early this year, and remembering that a number of years had elapsed since I was last there, have asked me for a few impressions of my trip. The thing that interested me most was the change that had taken place in Seattle. At the time of my previous visit one could see the unutilized flats stretching several miles south of the city, with the car line crossing them on a trestle. Today this region is dry land, covered with ship-yards and other industrial plants, and lined with vessels.

The shipbuilding industry, in fact, has assumed large proportions in Seattle, and as labor conditions are, at the moment at least, easier in this locality than in other parts of the country, the yards are able to work at their full capacity. So long as the demand for tonnage continues on anything like the present scale, shipbuilding is likely to be a boon to Seattle. Today the big payrolls at the yards are contributing materially to an enhanced prosperity throughout the whole community. A heavy fall in ocean freight rates after the war might of course materially impair this particular industry, but on the other hand it would be likely to work very much to the advantage of the lumber industry.

Since my return I have learned that the new Ames Shipbuilding plant closed contracts on March 3 for nine Cunard boats at a price of approximately eleven million dollars, and that the same week the Skinner and Eddy people took a contract for one 9400 ton boat for the Standard Oil Company. It is reported that the total value for boats under contract in Seattle yards is sixty-four million dollars, comprising forty-eight steel steamships and fifteen large wooden boats, in addition to numerous small ones, and also one cruiser and several submarines and torpedo boat destroyers for the government.

The lumber industry has not been in as good condition lately as in previous years, owing to the great advance in ocean freight rates and the great scarcity of railroad cars. When these disadvantages are overcome the movement of lumber from the Puget Sound Country should be very heavy and the effect upon the general business activity of that community pro-



EDWIN S. WEBSTER

nounced. In 1913 the United States government reported that there were 28,000,000,000 feet of standing timber in this country, 15,000,000,000 feet being in the Pacific Northwest. I was greatly impressed by the size of the lumber plants that I saw on my recent trip and by the character of the product they were turning out, and I am forced to believe that under normal conditions the demand upon the Puget Sound Country for lumber is bound to increase very rapidly.

The opening up of Alaska is another thing that is increasing the prosperity of Seattle and the Sound Country. Years ago the discovery of placer gold in Alaska brought a great deal of business to Seattle, but later the attitude of the Federal government in the matter of Alaska's resources, particularly the coal deposits, had a repressive influence. The situation has a better appearance today, however. The government is building a railroad in Alaska, people are going into the territory in increasing numbers, and the industries are being developed faster than before. A large part of the business bound for the north, as well as that coming from there, passes through Seattle, or other Puget Sound ports, all of which are gaining increased prosperity from this business.

When I was in Seattle I was interviewed by the newspapers, and among other things discussed the attitude of the Northwest toward capital. One of the papers reported me as saying: "When you assail the public service corporation, you strike at the Eastern investor, big and little. You frighten him and his money away. You want his money to develop your resources—then offer him the inducement of fair treatment." In a new country with such great resources as the Puget Sound Country outside capital is the thing most needed. Of course the business interests of that section are perfectly aware of this, but there are a good many persons in other walks of life who seem to forget it. I think, however, that if the demand for the resources of the Northwest increases in the way it should the need of further supplies of outside capital will be so imperative that even these persons will see wisdom of making conditions easy rather than hard for the Eastern investor.

SOUTH AMERICAN IMPRESSIONS

BY I. W. McCONNELL

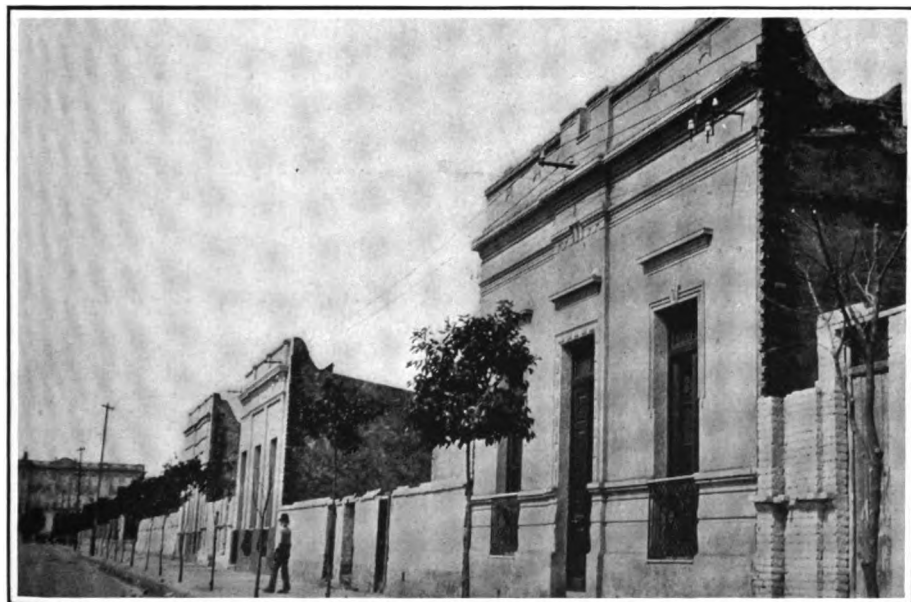
The man who invented the slogan "See America First" probably had no thought of South America. If he had not it would profit many of us to start another slogan, "See South America Next." If the slogan served no other purpose than to induce enough reading to establish more definite ideas as to the fundamental facts we should appreciate more keenly the situation of our fellow Americans and the huge task which South Americans face in bringing the continent to a state of general productivity.

South America is nearly as large as North America. It contains the greatest rivers, the highest mountains, the dryest deserts, and the greatest undeveloped land areas on the western continent. The republic of Brazil is larger than the United States by an amount of land equal to the State of Texas. If the republic of Chili could be picked up and placed across the United States from east to west with the northern border of Chile at the Port of Boston, the southernmost point of Chile would extend about three hundred miles into the Pacific ocean beyond the Oregon coast.

The Amazon River with its tributaries furnishes the broad highway into the equatorial section. Ocean going steamers can proceed up this great waterway to Iquitos, Peru, a distance of twenty-six hundred miles—or nearly as far as from Boston to San Francisco. Here the voyage is broken for transportation around rapids and waterfalls. Beyond these rapids navigation for smaller boats is possible for many hundreds of miles and indeed furnishes about the only means of communication between different sections of the up river country. The westernmost headwater tributaries originate in the perpetual snows of the lofty Andean ranges of Peru, Ecuador and Bolivia and the distance from the headwaters of the Amazon to the Pacific ocean is so small that no stream of sufficient magnitude to be of much commercial value finds its way into the Pacific from the South American continent. There are said to be localities at the point of origin of certain tributaries of the Amazon from which the Pacific Ocean can be seen. Such a river in the United States would originate in the coast ranges of California and Oregon and discharge into the Atlantic at the mouth of the St.



STUDENT BODY, AGRICULTURAL COLLEGE
Porto Alegre, Brazil.



STREET IN TUCUMAN
Note three systems of brackets for wiring on the house in the foreground.

Lawrence. It would drain practically the entire area of the United States.

The other great river system is that of the River Plate. Its great tributaries, the Paraguay, the Parana and the Uruguay drain a very large area, yet one much less than that of the Amazon. The tributaries of the Parana drain much of Southern Brazil. The Tiete River for example finds its sources in the hills along the Atlantic coast near the Tropic of Capricorn. Many of these small headwater brooks originate at points from which the Atlantic Ocean can be plainly seen. Thence the waters flow westward into the interior of the continent for nearly one thousand miles to the main channel of the Parana ultimately to be discharged into the Atlantic Ocean through the River Plate, about twenty-five hundred miles from the source by the meanderings of the streams.

There can be no doubt that these streams have influenced and will continue to influence in a marked way the progress and the development of the countries. Such civilization as can survive in the Amazon basin does so mainly through the transportation possibilities of the river. Opinion appears to be fairly unanimous that much of the Amazon basin is unfitted for white inhabitants, since it is hot, humid and covered by a tropical jungle reeking with the myriad diseases which beset human life under such circumstances. The main river basin lies practically under the Equator and at low altitude. The heavy rainfall and everpresent heat create a severe climate and a heavy handicap for the prospective resident. It may be accepted as fair prediction that these regions will be among the last of the earth to come under the control of man.

The basin of the tributaries of the Plate presents a different story. Northern Argentina, Paraguay, Uruguay and most of the progressive states of Brazil come within this drainage area. It contains the greatest grain belt in South America and those states in Brazil which produce over one-half the total coffee supply of the world. Those sections of the basin which lie within the Torrid Zone are sufficiently elevated to escape the enervating heat and the excessive moisture of the low lying coast lands and the jungles of the Amazon. It will be one of the great meat-raising section of the world, ultimately.

Passengers from the United States may get the first glimpse of the Brazilian coast at Bahia. If so they are fortunate; for just about the time ship board routine begins to grow wearisome,

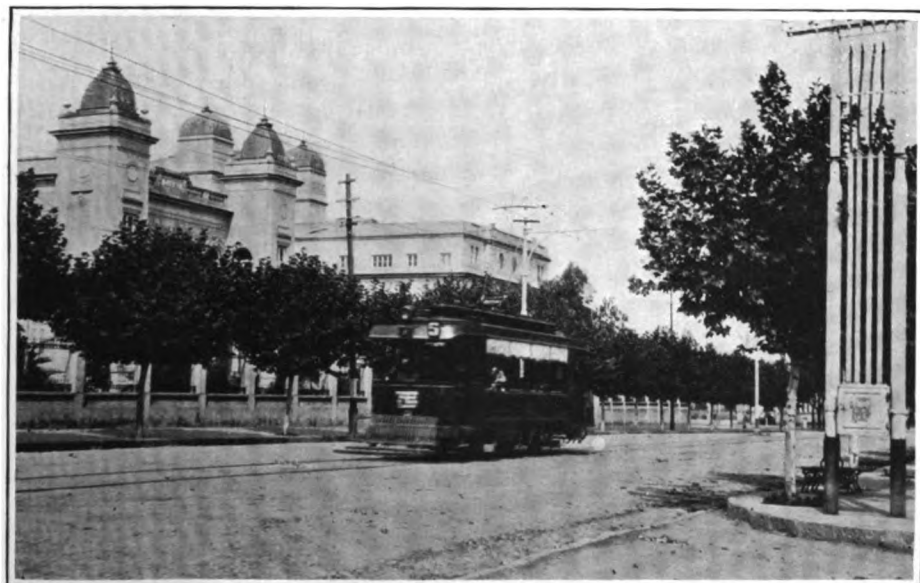
this port is reached. The view of the town from the harbor is fine. The old town nestles at the foot of a lofty cliff, the face of which is covered with palms, bananas, papayas and the other usual forms of tropical verdure. But to the stranger they are all new and very lovely. The top of the hill is seen to be covered by a closely built up city, the prevailing color of the houses being white which gleam in the bright sunshine. Here and there the towers and domes of great churches rise above the general mass of buildings. Back of the town the rolling hills carry the green fields of cane or other cultivation, merging here and there into the dark green of the tropical forest. Also, this is the old town of Brazil. Settled long before St. Augustine or Jamestown, it was the site of the first and the principal "Captaincy" under which Portugal ruled Brazil. A trip ashore reveals much of interest and also dispels some illusions. The buildings and the type of architecture are not redolent of modern ideas. The odors are strong but not uplifting. The street car system and the elevators by which one can be carried to the upper town are modern at any rate. Although it is Sunday the market place is in full swing, and the sellers are very importunate. One man who sells paroquets is determined to dispose of his wares. Another seller of monkeys is also a persistent solicitor. In one corner of the market place two negroes are disputing vociferously over a small package of sugar cane. We are offered coffee, fried chicken, oranges, bananas and many varieties of tropical fruits which we do not recognize. Here and there we see signs calling attention to merchandise made in the United States. The festive patent medicine man is evidently a welcome citizen and his signs at times occupy the whole view.

In the upper town we come upon typical scenes. There is a broad street paved with cobblestones with two story houses on both sides. In the angle of the street ahead an enormous cathedral fills that part of the picture. Beyond the cathedral a park set out in palms and laid out in formal walks and flower beds extends to other rows of two story houses. The streets are nearly empty, except for parties from the ship. A party of soldiers approach carrying a burden which is seen to be a funeral casket. Following the custom of bystanders we raise our hats as the procession passes.

One of the common sights of Brazilian cities is the funeral procession. Sometimes it is an imposing array of carriages most of them empty following a richly furnished hearse; more fre-



SANTA MARIA
State of Rio Grande do Sul.



SAVOY HOTEL AND CASINO; STREET RAILWAY
Tucuman, Argentina

quently it will be a party of women and girls carrying among them a frail and tiny casket garrishly decorated. It is not unusual to see a strapping negro striding along the street toward the cemetery carrying a coffin balanced on his head. External signs of grief are rarely visible and frequently the funeral takes on the aspect of a picnic.

Tropical vegetation usually leaves an impression of beauty when viewed from a distance. Along the coast and in the lowlands the palms are abundant and there are many broad leaved plants of the plantain and banana type. As the ship skirts the coast small collections of houses or single houses set among the palms give an air of home comfort, very appealing to the imagination. If the distance from shore permits details to be seen, it will be found that in favored localities along sandy beaches and under sheltering palms or bamboo, thatched huts are located. The walls may be a plaited mat of slender bamboo rods or the house may be only a thatch roof elevated on poles with a few grass mats or animal skins hung up to stop the rain or strong winds. Lightly clad people loll about. A boat may be at hand with fishing implements. Naked children play about. A convenient banana plant suggests the principal source of food. If a chain of monkeys would swing from one tree to another the picture would be complete.

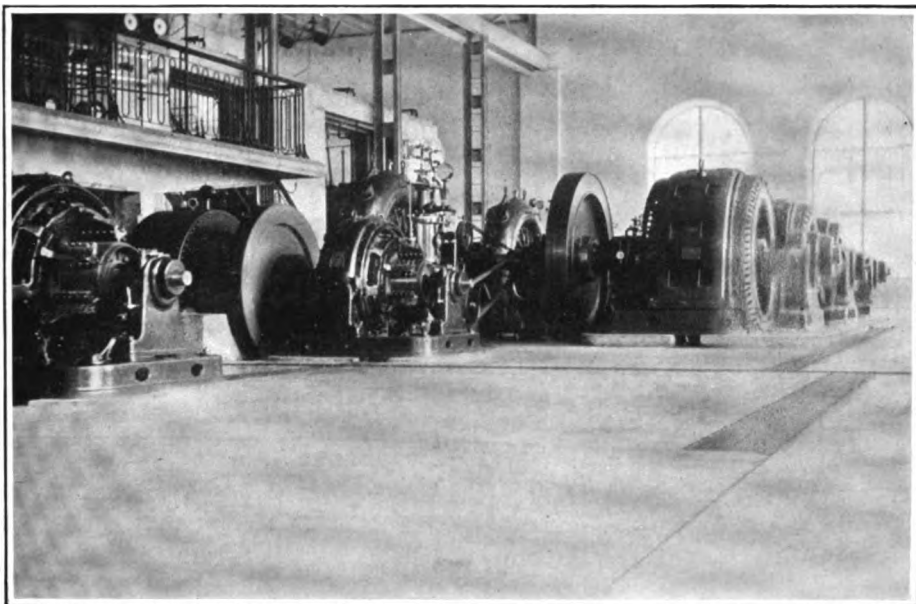
But too close inspection is not always wise. The graceful palms and the luxuriant banana plants have a way of shedding dead branches, or what corresponds to branches, which do not fall to the ground but which remain attached to the main stem and leave a sense of slovenly untidiness—a sort of rag-tag and bob-tail slackness—which is disappointing after the lovely long-distance view. One learns quickly that the vegetation swarms with insect pests of one sort and another. After one or two careless encounters with tropical vegetation one knows of several definite disagreeable bugs which can be found about his person and every trip into the bush, forest or field will be followed by a good bath and a conscientious search for ticks before the industrious things dig their heads under the skin and take up a permanent residing place there.

From the vicinity of Cape San Roque south to the Uruguayan border the Brazilian coast presents the aspect of a chain of lofty mountains or the abrupt foothills of a mountain range. In places the mountains come abruptly down to the coast. In other places a shelf of low land stands between the sea and the

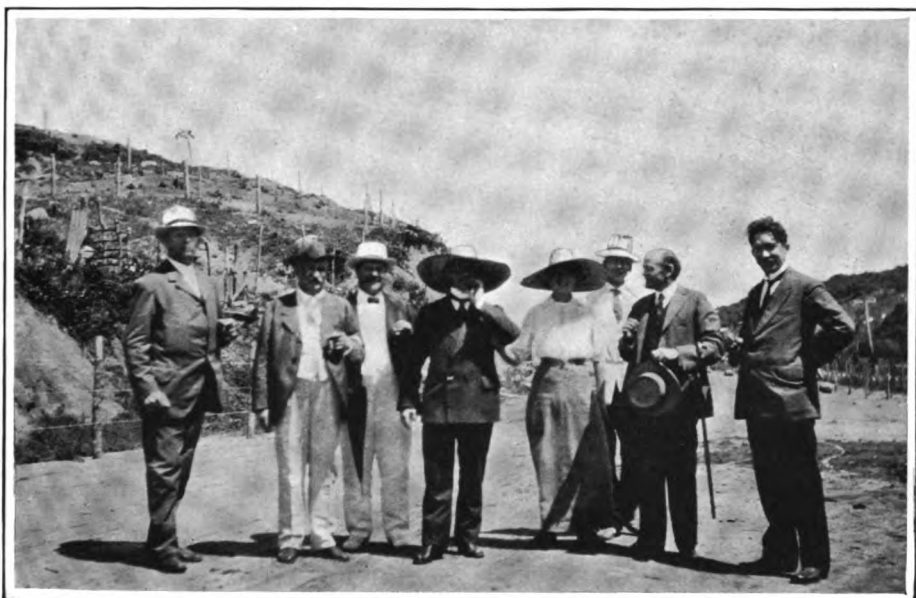
high hills but in practically all portions of this coast the mountains if they do not stand close by the shore are visible from the ships that pass nearby. The warm ocean breezes, moisture laden, blow inland where the moisture is condensed in the cooler air of the mountain slopes with heavy and frequent rainfall and with prevailing mists. These are ideal conditions for vegetable growth and the wealth of the vegetable kingdom almost passes comprehension. In the virgin forest the hardwood trees survive and push their tops continually upward to the light. Viewed from above, this forest presents a billowy ocean of dark green, broken here and there at frequent intervals by great masses of bloom of blue, or purple or yellow. It is a wonderful sight to see a tree as large as the biggest elms of our New England woods covered with gorgeous flowers. Under this enormous canopy there is a region damp, hot, silent and always in shadow which is deserted alike by living creatures and by leaves and flowers. Under foot there may be a mat of roots and creepers with certain forms of ground plants. The birds occupy the upper zone in the branches and above them. The creeping things live on the ground. The insects are ever-present ready to contribute their small bites to the variety of life.

But the elevations which from the ocean look like mountain ranges and which are called Serras are in reality the edge of a great plateau which slopes from this eastern escarpment westward to the main drainage of that part of the continent—the Uruguay River in the South, the Parana River in the regions contiguous to the Tropic of Capricorn and between the meridians of 45 degrees and 55 degrees West. The easterly edge of the plateau rises to altitudes of three thousand feet, more or less. The streams gather volume rapidly and pour their floods over numerous waterfalls and through rapidly descending channels into the main streams. In all the states of south-eastern Brazil there are numerous undeveloped water powers too remote from present markets to justify development. If and when Brazil becomes an industrial nation as contrasted with the agricultural nation which it now is, the water powers of Sao Paulo, Goyaz, Minas Geraes, Parana, Santa Catherina, and Rio Grande do Sul will be a valuable resource.

On the plateau a marked change in climatic conditions takes place, and the climatic change produces interesting variations in the vegetable growth and in the aspect of the country.



HYDRO-ELECTRIC STATION
Tucuman Railway and Light Company



VISITORS AND OFFICERS OF TECHNICAL SCHOOLS, PORTO ALEGRE, BRAZIL

Left to right:—German Peterson, General Barreto, A. Gins, Dr. Gustine, Marguerite Gustine, Mr. Blair, I. W. McConnell, Antonio Porfirio.



URUGUAYAN FREIGHT TRAIN, AND TYPICAL LANDSCAPE

Cars covered with canvas contain wool or products requiring protection from the weather.



URUGUAYAN WOOL CARTS AT RAILROAD STATION

The oppressive heat of the coastal flats gives way to cooler and more bracing air. The dense and smothering vegetation of the Serra is replaced by alternating forest and grassy areas; in the cooler months frost is occasionally experienced on the high hills and in the most susceptible localities.

At the port of Santos, for example, we find a coastal flat some ten or twelve miles wide which is cut up by meandering rivers, generally swampy in character, distressingly hot in summer and too warm in winter. The climb up the Serra on the Sao Paulo Railway is an enchanted journey with the heights and the tropical forest on every hand. In four hours the city of Sao Paulo is reached where all comforts of city life may be had. It is the center of the coffee business of the state of Sao Paulo, which furnishes one-half the coffee used in the world. It is a city of handsome residences, beautiful parks, paved streets, and good street car service. Its water supply, sewage system and street cleaning are well conducted. Yellow fever and bubonic plague have been eliminated. There is a municipal opera house and numerous public buildings, patriotic monuments, charitable institutions, and churches. The prevailing religion is Roman Catholic but most of the evangelical denominations have established churches. There are many industries established and growing. The foreign colony contains many Americans (Yankees), Canadians and English. The Italian element is very strong and is taking a prominent and energetic part in the development of the country. A well managed power company under the direction of American officers furnishes ample electric power for industrial work. The people move about with energy and have a thrifty, prosperous air.

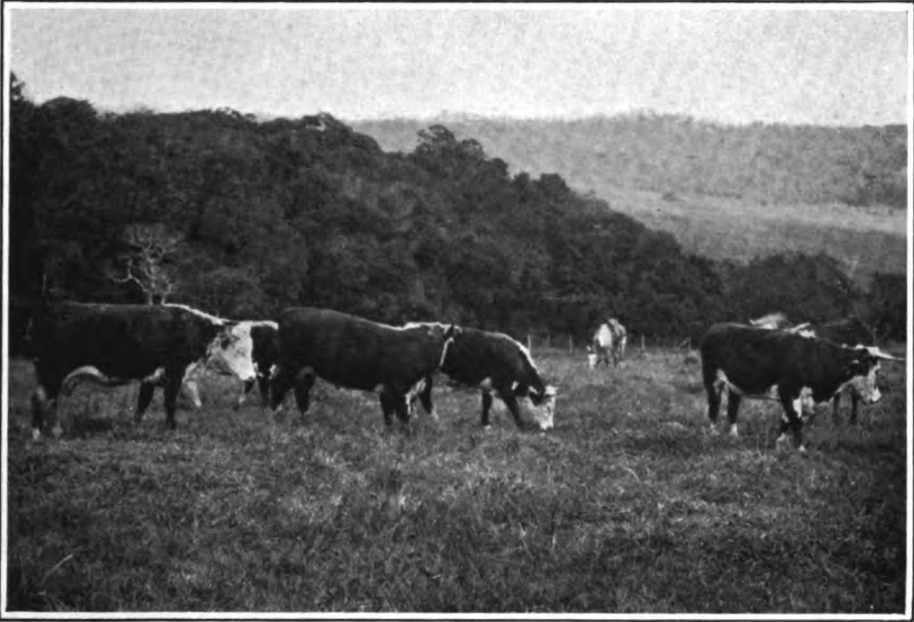
The time-honored industry is coffee production. Some years ago the industry fell into decline on account of an oversupply. By the restriction of planting and the so-called valorization scheme by which surplus crops were carried by the federal government from years of excess crop to years of deficient crop the industry was stabilized and is now prosperous. As now conducted the coffee industry is a highly concentrated industrial operation carried on mainly on large plantations (fazendas) by hired labor. Economic writers reserve the coffee situation for discussion whenever business is slack in other lines of economic writing. It has had the best thought of Brazilian economists and they are not agreed that the industry can sur-

vive in its present aspects. It is admitted that Sao Paulo has certain climatic advantages which will make competition very difficult for other countries and other sections of Brazil if the stage of overproduction is reached again, but some writers think an era of small holdings will set in shortly and for this era they predict a much more enduring resistance to elimination through competitive processes than could be expected of the industry in its present condition. The argument is that Sao Paulo can withstand any evolution which economic factors may bring to the coffee industry and her future prosperity can be safely built upon that business.

Southeastern Brazil is served by the lines of the Brazil Railway Company. This company now under a receivership is managed locally by an American, Mr. Nolting, who has had a wide and varied experience in Spanish American countries, in the Philippines and in Brazil. Its main line runs from Sao Paulo southward to the Uruguayan border at Sant Anna do Livramento. Branch lines run from the main line to the coast at San Francisco and at Paranagua, State of Parana, to Porto Alegre, capital of the State of Rio Grande do Sul, to the Port of Rio Grande do Sul, and to the Brazil frontier on the Uruguay River at Uruguayana.

The trip from Sao Paulo to the towns of Rio Grande do Sul and thence across Uruguay to Montevideo, the capital, opens to view a wonderful country, much of which is unoccupied at the present time. The coffee belt is left behind soon after leaving Sao Paulo. Thence for three days the road runs through a rolling hill country partly forested but mainly "Campo," or grazing lands. Some cattle are in sight but the country would support vast numbers more. Land is very cheap, the prevailing price usually discussed ranging from 30 cents per acre up to \$2.50 per acre. Such prices have no relation whatever to value. They merely indicate how cheaply land is held.

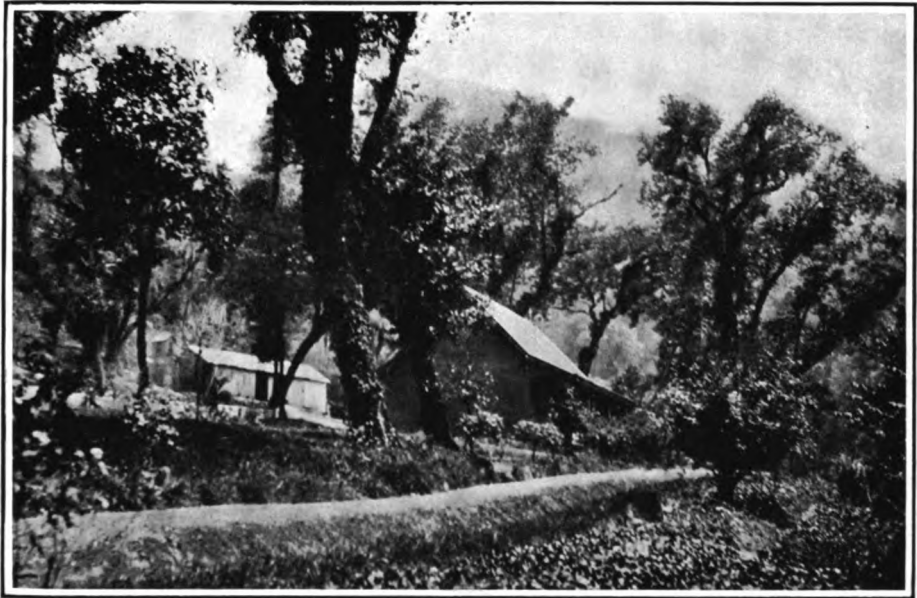
Wherever conditions favor in Parana and Santa Catharina a growth of that conifer called Parana Pine is found. Usually it is scattered widely over the landscape, rarely shading the ground sufficiently to prevent other growths. Most frequently the Parana pine will stand fifty feet or more above an undergrowth made up of bamboo and hardwood trees. The bamboo may be thirty or forty feet high and as thick as it will stand on the ground. The hardwood forest is usually made up of trees 100 feet high or more, so the Parana pine will be found usually



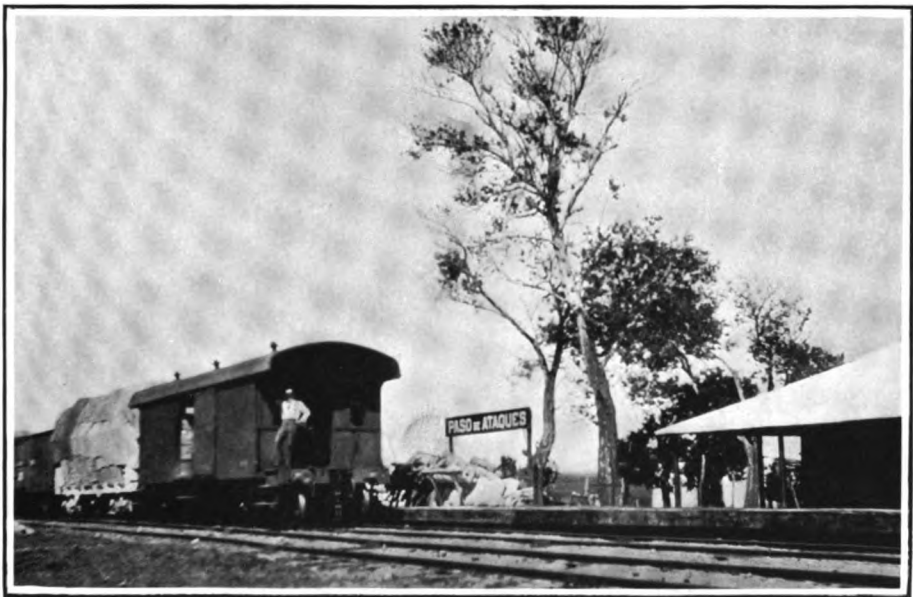
REGISTERED HEREFORD CATTLE
Brazil Land and Cattle Company, Murdo Mackenzie, Manager, Sao Paulo, Brazil



BRAZILIAN YEARLING
Brazil Land and Cattle Company.



EMPLOYEES' HOUSES
Tucuman hydro-electric plant. Located in tropical forest.



TYPICAL URUGUAYAN RAILWAY STATION

as a lofty tree free of limbs except at the top. The wood is not as good as our northern pines. It is said to be too heavy to float when green and to warp and crack in seasoning.

Brazilian hardwoods are found in amazing variety. They may be found in every shade and color and combination of grain. One agency in Sao Paulo lists one hundred and forty-eight varieties. Many of them are extremely hard, too heavy to float and difficult to work. Like most hardwood they show a tendency to crack and warp when sawed into plank.

The leading industry of the State of Rio Grande do Sul is stock raising. Travelers by the Brazil Railways pass into the state at Marcellino Ramos where the Alto Uruguay River is crossed. Shortly after leaving the river canyon herds of cattle begin to be in evidence, and throughout the state there is evidence that the grazing industry is highly developed and that the land is much more nearly occupied than it is in the states to the north. In Parana and Santa Catharina a herd of cattle would be in sight somewhere in the landscape at any time. In Rio Grande do Sul there were herds in sight on every hand at all times. These southern cattle were of better grade than those north of the river. Evidences of Hereford and short horn strains began to be in evidence. The horses were larger and cleaner limbed. The riders were palpably high-class horsemen rather than men riding on horseback.

The best cattle in South America are found in Southern Uruguay and in Argentina. Stockmen in both countries have imported registered Hereford, Short-horn, Polled Angus, Gallo-way, Jersey, Alderney and other strains and have bred up their herds until they compare favorably with the best cattle in the States. Every day in Buenos Aires there are registered cattle sales at which animals of the highest grade can be bought. These countries are well supplied with packing houses, so that a permanent market working on world prices is assured. In Brazil there are packing houses at Sao Paulo and Rio de Janeiro. It is announced that an American firm will erect a packing house at the port of Rio Grande do Sul.

Only a limited amount of refrigerated or stored meat is sold for local consumption in South America. The natives prefer "carne verde" or meat freshly killed. The packing houses, as a rule, kill only for export. All of their product is refrigerated or cured. Refrigerated beef is shipped in refrigerating ships to Europe or to the United States. Packers there say that the

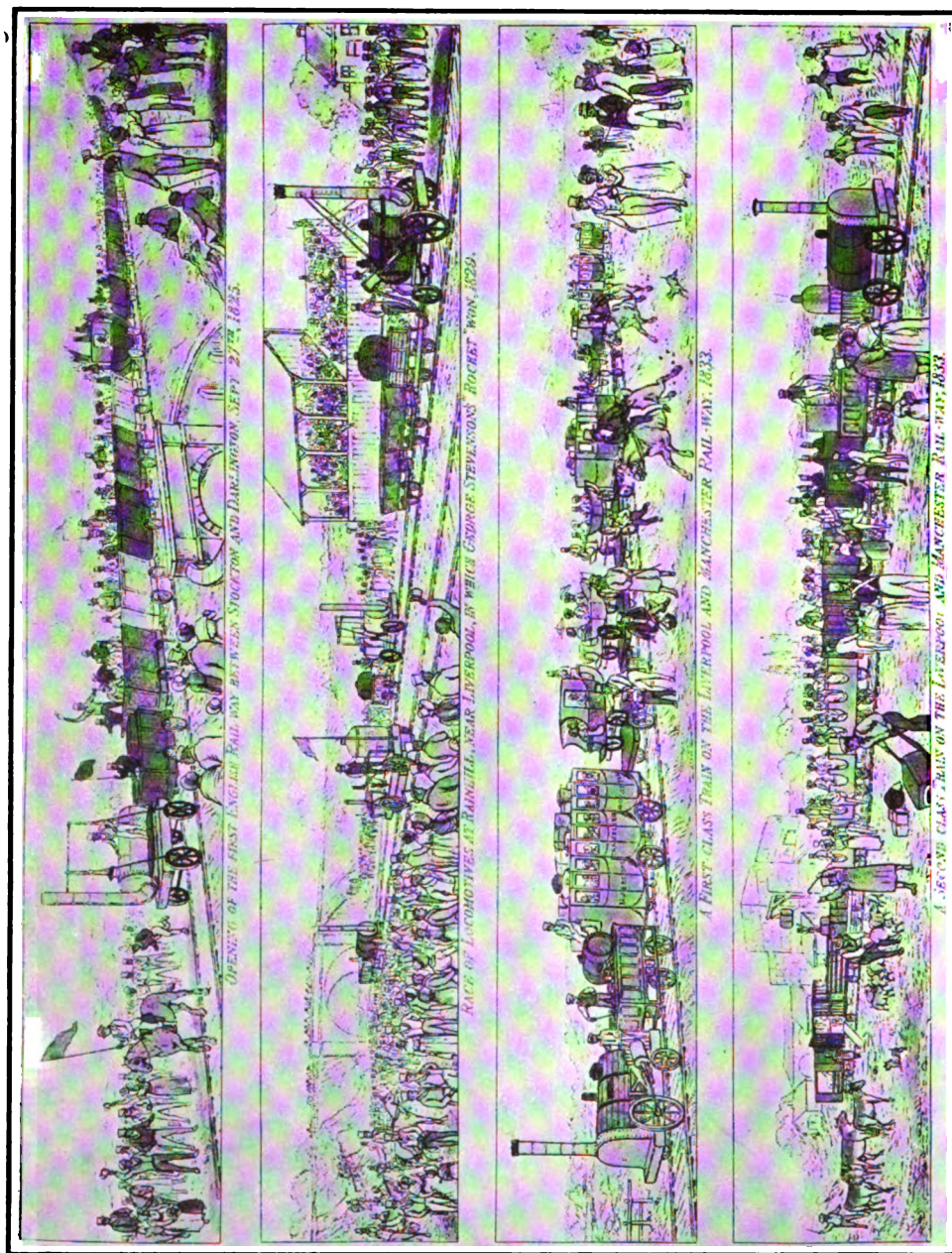
Argentina beef fattened on alfalfa is substantially the equivalent of American beef. Perhaps our cornfed beef is more richly flavored but the difference is not sufficient to justify the expense of feeding corn, at least during war times, in South America.

In Rio Grande do Sul large German and Italian colonies are making efforts to diversify the production of the farms. The state produces its own requirements in rice, beans, and corn, and a flourishing export in tobacco is growing up. The better grades of Rio Grande cigars compare favorably with Havana cigars.

At Porto Alegre, the capital, the state of Rio Grande do Sul maintains a technical school for engineers, architects and agriculturists. All of these institutions are well equipped with laboratories and apparatus. The students present much the same appearance that students do in the States. Already, the graduates of the engineering schools are beginning to take an active part in the affairs of the community.

South of the Uruguay River the country takes on the aspect of rolling hills. Wooded lands become less frequent, long views across comparatively flat lands become frequent. Santa Maria in Rio Grande do Sul might be in the wooded hills of Missouri or in the Shenandoah Valley in Virginia. Passo Fundo might be in the Laramie River country of Wyoming. The market gardens around Buenos Aires might be the flat prairies around Chicago. The landscape around Salto Uruguay is very similar to that of Eastern Kansas.

The commercial progress of a country probably bears some direct relation to the degree of intelligence of the workers. South America as a whole can well afford to expend effort and money on the general welfare of its working people. The educated classes are polished, refined, capable. The laborers who must carry the burden in the heat of the day are ages behind in mental and moral progress and in the cultivation of those ideals which are the forerunners of national unity and progress. There is a great country with tremendous potential resources. It needs only the vision of the dreamer made real by the labor of many hands to bring it to the realm of reality.



HISTORIC RAILROAD PICTURES

THE EVOLUTION OF THE RAILROAD

BY F. J. WOOD

Although the turnpikes contributed very much to the advancement and prosperity of the nation, they were not themselves financially successful, nearly all of them resulting in a total loss of the investment. In many cases this was due to lack of business rather than to any difficulties in operation, but all of them had their troubles in the maintenance of a wearing surface and this, on the much-travelled roads, constituted a serious problem. As in all such emergencies, the best brains of the time were drafted to effect a solution, and to the efforts of that period we are indebted for the principle on which our state highways are constructed. John Loudon Macadam, who had been a resident of New York and an officer of the Crown in that town during the Revolution, found the atmosphere of old England more congenial after peace was established and returned to his native country, there to become later Inspector of Turnpikes. During his incumbency of that office he evolved the principles on which macadam roads have ever since been constructed. But in New England that form of construction did not fully meet the needs, as suitable rock was not always available within the limits of economical hauling, and the search for a durable surface still continued. Gradually the idea of confining the wheel to a narrow path instead of endeavoring to harden the whole width of a broad roadway grew in favor, and from that the step to the railroad was short.

Railroads like most other important inventions had very humble beginnings. The first roads properly called by that name consisted of a rude line of wooden or iron rails laid down for the easier guidance of wagons in which coal was hauled from the mine to the shipping place. It is in Newcastle, England that we find such means first employed, about the year 1630, and within the next fifty years they were generally adopted throughout the principal colliery districts. For the next century and a half but little improvement seems to have been made, for we find this description of a colliery railroad near Newcastle written by a traveller about 1772:—

“The coal wagon roads, from the pits to the water, are great works, carried over all sorts of inequalities of the ground, so far as a distance of nine or ten miles. The tracks of the wheels

are marked with pieces of wood let into the road for the wheels of the wagon to run on, by which means one horse is enabled to draw, and that with ease, fifty or sixty bushels of coals."* And from the writings of a French traveller in 1791 we learn that the wheels of the wagons were made of cast iron, concave faced, so that the rail fitted the wheel as a rope fits the rim of a shieve.

Naturally the wooden rails wore out rapidly and soon efforts were made to prolong their life by nailing thin strips of iron, or plates, on their wearing surfaces, from which fact the early roads were often called "Plate Ways." The earliest iron rails were laid at Whitehaven in 1738. The first appearance of rails and wheels on the principles followed today was in Leicestershire in 1789 and was due to William Jessop. He first used the side bearing method and introduced the wheel with an inner flange. An improvement effected by Benjamin Outram, about 1800, in track construction caused such roads to be known as "Outram Roads," which was later shortened to "Tram Roads," a term in use today.

Such was the state of the art when those weary of worn-out turnpike surfaces first turned to the railroad principle for a way out of their difficulties.

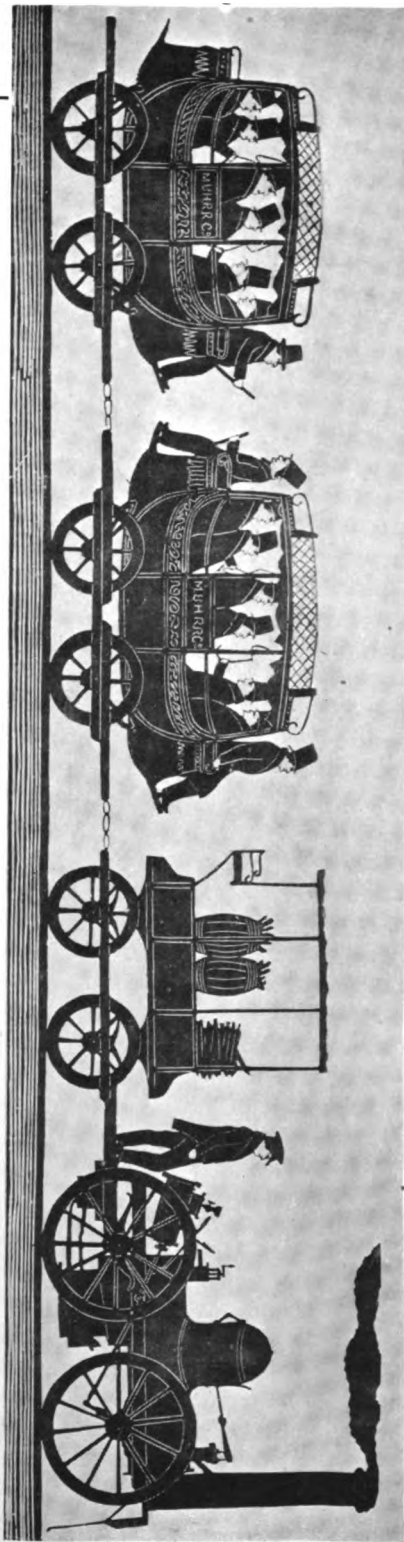
The first conception of a railroad, both in America and England, was that of an improved form of turnpike over which the public was to have the same rights and privileges as on the older style of roads. In accordance with this idea any one having a wagon or carriage equipped with the proper form of wheels, and a horse or horses to draw it, was at liberty to enter upon the track without notice to anybody and drive whithersoever he would at his own rate of speed, stopping only at the toll gates at which he was already accustomed to stop for the purpose of paying toll.

In the first of the two charters granted for a railroad from Boston to Providence, in 1830, it was provided as follows:—

"Section 6. Be it further enacted, That the directors of said corporation, for the time being, are hereby authorized to erect toll-houses, establish gates, appoint toll-gatherers, and demand toll upon the road when completed. . . ."

Only one case has been observed in New England where it was attempted to convert a turnpike into a railroad. The proprietors of the turnpike which occupied the road now known

*This appears to be about two tons.



THE FIRST STEAM RAILROAD PASSENGER TRAIN IN AMERICA

This train was operated over the Mohawk and Hudson Railroad in 1831. The road, which was chartered in 1826 and built in 1830-1, was sixteen miles in length, connecting Albany with Schenectady. The locomotive was imported from England and bore the name of "John Bull." Its weight was but four tons and its greatest speed was probably not in excess of ten miles an hour. The couplings were links of chains, which caused violent jerks in starting and equally violent bumps in stopping the train. It is related the passengers, at the first stop on the road, wedged pieces of fence rails between the cars in order that the beginning and ending of the subsequent stages of the journey might be attended with less discomfort.

as East Avenue in Pawtucket and Hope Street in Providence secured an amendment to their charter in 1837 by which they were to be allowed to lay rails on their road, but not in such a way as to interfere with the use of the road by ordinary wagons. The amendment further gave them practically a new railroad charter in new territory, for they were granted the right to build a railroad along the route, later built by the Providence and Worcester Railroad Company. The theory of an improved form of turnpike is found expressed in this charter, for section 6 allows the directors to determine the rates of toll to be collected from all travellers on the road and to prescribe the form of cars and wheels and to limit the loads,

“PROVIDED, that no regulation shall be adopted by said corporation, that shall exclude individuals residing on said road, from travelling on the same in private cars; conforming in all things to such regulations, and paying such tolls as may be required by said corporation.”

The erection of toll houses and gates was also allowed.

The bill providing for the construction of the first railway in England the Stockton and Darlington, passed in April 1821, required that the public was to be free to use the road with horses, cattle, and carriages during the daylight hours, upon payment of the authorized rates of toll. When operation commenced different lines of stages entered upon the new road and all sorts of difficulties arose, as can readily be imagined on a single track line. As long as the motive power was confined to horses or cattle the mixed and uncertain operation was allowed to continue, but with the introduction of the locomotive it became necessary to establish a central control, and soon no vehicles but those of the corporation were permitted on the rails.

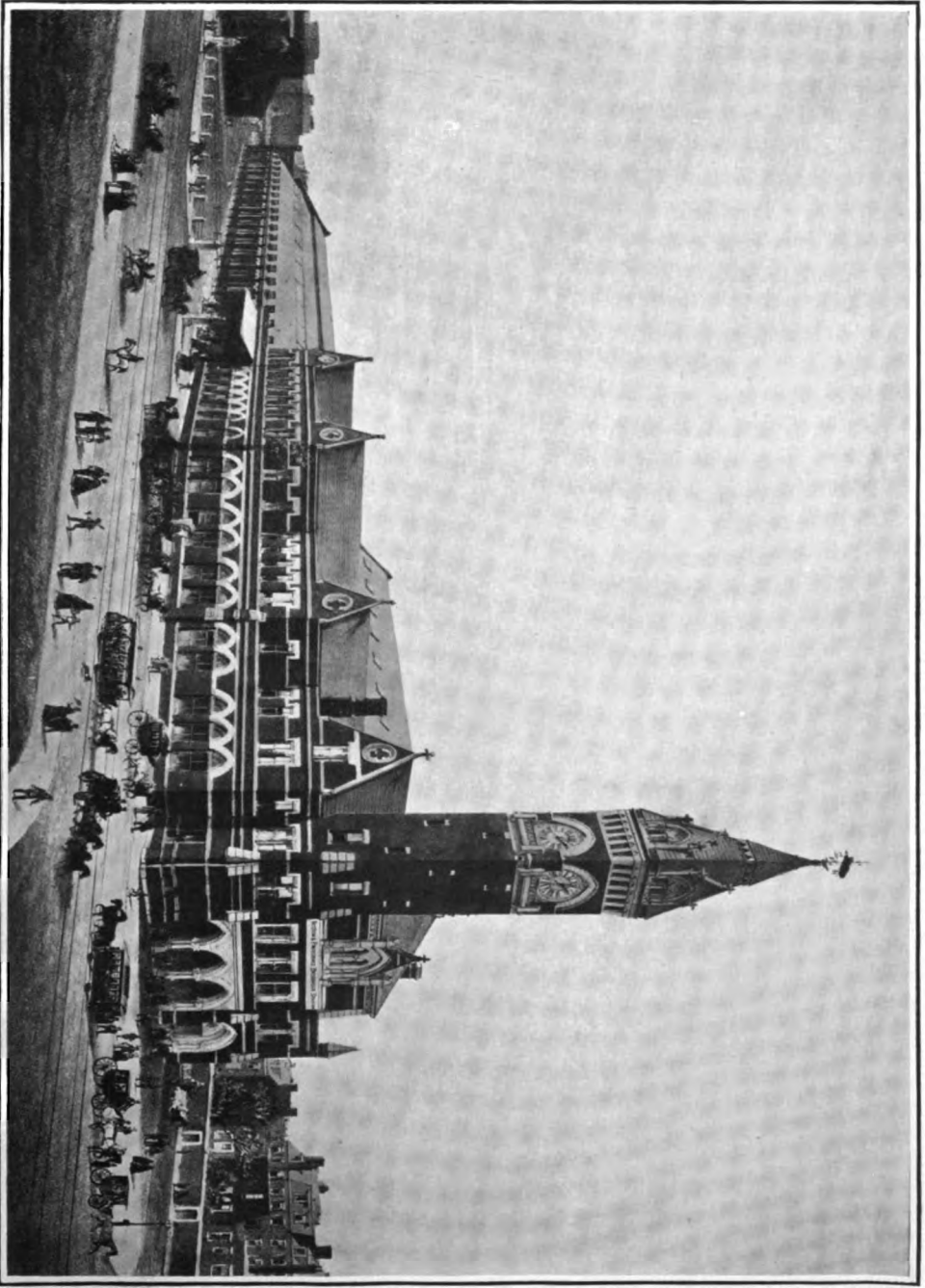
It does not seem that much trouble was experienced in America, as the earliest road was built about the time that the success of the locomotive was finally demonstrated, and hence there was but little horse drawn operation. But Mrs. Earle in “Stage Coach and Tavern Days” gives an amusing account of a road in Pennsylvania, on which private teams were driven and on which frequent congestions of traffic occurred owing to the proclivity of certain drivers to stop at the taverns along the way.

The most interesting case in which the right of the public to enter upon and use the railroad was asserted occurred in connection with the Boston and Providence Railroad. That

road having been completed and opened, another corporation was granted a charter under the name of the Seekonk Branch Railroad, the promoters of which carried out their plan of building terminals of their own with short stretches of connecting track by which they could reach the main line of the Boston and Providence. Then without any investment in the forty miles of intervening track and paying only current tolls for passing over the same, the Seekonk Branch Railroad entered into a full railroad business in active competition with the road whose tracks it was using. For about three years the operations of this company, which ran its own trains drawn by its own locomotives, was a serious annoyance to the management of the original road. But, according to the conception of that day, the intruder was within its legal rights and the trouble was only settled by the older company purchasing all the stock of the Seekonk Branch. Then the passage of a law was secured by which all railroad companies were forbidden to enter upon the tracks of another with their locomotives without consent. Thus about 1840 the railroads became emancipated from the old turn-pike conceptions and entered upon a classification of their own.

In the light of the successful operation of long single track railroads it is amusing, at this time, to see the difficulties which were anticipated by the early promoters of railroads, to whom the construction of a second track must have seemed unattainable. Expecting considerable traffic of the mixed and irresponsible sort which has already been described, the Stockton and Darlington Road was provided with four passing tracks to each mile. Although the Boston and Providence did not anticipate any amount of horse drawn private cars, the difficulty of passing trains, moving in opposite directions, before the telegraph kept all in touch with the central office, seemed so serious that the road was originally projected for a double track, the second to be built as soon as possible after the first was completed. In the original construction a long passing track of several miles was provided in Mansfield, about midway on the line, on which trains leaving each terminal at the same time were reasonably certain to meet. Before operation with this means of passing trains was demonstrated as a success, the prosecution of the second track had been pushed from the Boston end to Roxbury Crossing, but it was many years before any further double tracking was undertaken.

The first railway passenger car, which was drawn by horses on the Stockton and Darlington Railway, was a long box-like



BOSTON AND PROVIDENCE STATION, PARK SQUARE, BOSTON, DEMOLISHED IN RECENT YEARS

affair with seats along the sides and a deal table in the middle. On this table was practised the first effort at car illumination, for the driver, being a kindly soul, used to provide a penny candle which he stuck up in the car to cheer the night journey for his passengers.

In America the early car builders seem to have been more conservative and here again the influence of the turnpike is strongly evident. The early stages had been uncomfortable affairs with no springs and parallel cross seats access to which was had only from the front and by climbing over the intervening seats. A flat roof was supported by upright posts and some coaches were provided with curtains on the sides. Such vehicles were superseded by the egg-shaped coaches, generally shown in the old prints of stages and which were generally used throughout the stage coach period. The well known Concord coach was introduced in the early 30's, just in time to be seized upon by the designers of rolling stock for the new railroads.

As can be seen in the illustration of "The First Steam Railroad Passenger Train in America," the body of the Concord coach was adopted and, mounted on four-wheeled railway trucks, became the first American passenger car.

The first class cars which appeared in England soon after the successful operation of the locomotive, had the appearance of three stage coach bodies, joined together, and mounted on one truck; but the exclusive travellers sat in their own equipage which was temporarily mounted on a flat car.

The custom of burning wood on the early American engines with the resulting showers of sparks, prevented the continued use of any such open vehicles as are here pictured and a car suggesting the outlines familiar today soon appeared.

The tall granite monument on Bunker Hill not only commemorates the battle which demonstrated the ability of the colonists to stand against the trained troops of England, but also the building of the first railroad in America. It was the need of transporting those huge granite blocks from the Quincy quarries to tidewater that called for more effective means of carriage, and the railroad was built under a charter granted in 1825; from April 1st to October 7th, 1826 being occupied in the construction. The road was four miles long and cost fifty thousand dollars.

Wooden rails six inches wide and twelve inches high were laid on transverse sleepers of stone spaced eight feet apart, and the upper surface of the rails was protected by plates of

iron three inches wide and a quarter of an inch thick, fastened on with spikes. At the road crossings stone rails were substituted for the wooden ones, and after the wooden rails had begun to decay they were entirely replaced with stone, similarly protected by iron plates. After thirty years operation the treasurer of the company stated that the maintenance of the road-bed had not cost ten dollars a year. The operation was entirely by gravity or horse power.

Following the successful opening of this road a petition was presented to the Massachusetts legislature late in 1826, asking for detailed surveys and investigations on the subject of railroads, by means of which the commercial prestige of Boston might be retained, as New York was at that time forging ahead by means of the Erie Canal. A commission was accordingly appointed which prosecuted its studies during 1827 and 1828 and submitted its report in 1829.

After describing the methods of track construction on English roads the conclusion was offered that, owing to the high price of iron in this country and the plentiful supply and cheapness of suitable stone, a better method would be to construct a continuous stone wall under each rail, laid deep enough to be below the action of frost. On this would be placed a rail of split granite one foot wide and one foot deep, hammered on top and on the upper edge of the inner face, with a bar of iron for the wheel to run on, fastened to the stone at each foot by bolts or rivets. These rails were to be five feet apart and the space between them filled within six inches of the upper surface with earth or gravel to form a path for the horses.

The report was supplemented by one from Solomon Willard, the architect of Bunker Hill Monument, who travelled over much of the State, examining the suitability of various supplies of stone and convenience of access. He offered the following estimate for the construction of a road of two tracks:—

“For quarrying the rail stone	5 cts. a foot.
Dressing and preparing for the work	4 cts. a foot.
Hauling to the line of the road	4 cts. a foot.
Opening quarries and making roads	1 ct. a foot.
Making for these items, 14 cts. a foot	\$9.24 a rod.
Digging, hauling, laying the trench wall	3.84 a rod.
Excavating four trenches	0.50 a rod.
Laying rail stone and putting on iron	2.00 a rod.
Transporting iron rails	0.50 a rod.
	<hr/> \$16.08 a rod.

The report of the Board was a masterful treatise on a subject of which so little was known, and went at length into consideration of the increased tractive power of a horse on such a road. It gave estimates of the expense of operation, statistics of past travel and freight, and consideration of the question of how to apply additional power for surmounting steeper grades. For grades not exceeding twenty-six feet per mile, the load for a single horse was given as ten tons; with eighty feet per mile as the steepest, five tons per horse. The cost of transporting a ton of merchandise from Boston to Albany was computed at \$2.97, for which four days would be necessary. Passengers were to be carried in twenty-two hours for \$3.05.

The legislature of 1829, however, seems to have been of the hard-headed practical kind which, taking little stock in theoretical reports and "surveyors' pictures," preferred to judge the subject by hard and fast facts. Although Massachusetts was the pioneer in railway building by having the Granite Railway in Quincy in operation in 1826, other states had outstripped her, and in 1829 extensive improvements were under way in New York, Pennsylvania, Maryland, and South Carolina. So a committee, consisting of Edward H. Robbins and James Hayward, was appointed to visit the "works of internal improvement" in Pennsylvania and Maryland, and to return with accurate information of what had actually been done and what it was really costing. This committee first visited the works of the Delaware and Hudson Canal and Railway Company, travelling by canal from Kingston, on the Hudson, southwesterly to the Delaware river near the northern extremity of New Jersey, up the Delaware to the Lackawaxen, and along the Lackawaxen to its head near Honesdale, a distance of one hundred eight miles. They found that the canal cost, on an average, about \$18,000 a mile, including much rockwork, and that the lockage was 1,088 feet. From Honesdale they went to Carbondale by rail, sixteen miles over Lackawannock mountain, requiring a rise of eight hundred feet in the first three and a half miles. This was surmounted by inclined planes of 1: 12 and 1: 20 inclinations, up and down which cars were passed by stationary engines and endless chains. Beyond the summit the cars were operated by gravity or horse power. The committee rode up a plane three or four miles in length in a train of four "waggons (a net ton each)," in which were twelve men "with some other luggage," all of which was drawn by "a small horse.

of very ordinary appearance which did not break his trot for the whole distance."

The track was composed of six by ten inch wooden rails with iron plates $2\frac{1}{2} \times \frac{1}{2}$ inches, fastened on top, and supported on cross-sleepers at intervals of ten feet. The committee stated that it was a well-ascertained fact that a horse could draw a much greater load upon a railway of granite than on one of wood. More than four hundred tons a day had been passed over that road, the cost of which, exclusive of engines and apparatus for passing the planes, had been \$6,500 a mile.

From Carbondale the committee went down the Lackawannock river to the Susquehanna, inspected the work on the Middle Division of the Pennsylvania State Canals, and gathered much information relative to the projected system of canals by which the state was to be covered. In the Susquehanna valley the Pennsylvania Railroad was under construction by the inhabitants of the valley, who deemed it desirable to connect the Pennsylvania canals with Philadelphia. An easy route would have been to follow the river to Baltimore, but the railroad gave trade to Philadelphia, and also gave the valley farmers two markets for their goods.

The work of constructing the Baltimore and Ohio Railroad was then inspected by the Massachusetts men, who found two or three miles actually completed and another twenty-five miles ready for the rails. In its report the committee dwelt at length upon the costly features of the work in Maryland, which would not be met in Massachusetts, and it is evident that the opponents of railways had attacked the estimates submitted for Massachusetts construction, using more or less accurate data from the Baltimore and Ohio for their weapons. The report states that the original estimates had been overrun largely on account of substituting stone bridges for wooden, incurring a cost of \$336,000 for that item in the first twenty-five miles; and triumphantly points to the fact that the costs ascertained on the railway and canal work in Pennsylvania confirmed the Massachusetts estimates.*

Concluding, the committee expressed the conviction that railroads were far better than canals, and that Massachusetts was as well adapted for their construction as any place, and hoped the State would not fall behind the others in such work.

*Transactions American Society of Civil Engineers, Vol. LXXIV, page 156: Discussion on Railway Development by Fred J. Wood.

In a further effort to gather definite data from actual work, Governor Lincoln of Massachusetts addressed a letter to the president of the Baltimore and Ohio Railroad, asking to be advised in regard to the progress already made on that work; the manner in which it was being done; and the costs. An elaborate reply, made by Colonel Long, president of the board of engineers of that road, may be seen in the Massachusetts archives. It contains a general description of the location and many details of the construction, but at present we will only consider the manner in which the track was laid. The roadbed was graded for a width of twenty-six feet in cuts and fills, and of this twenty feet was macadamized with 2 and 2½ inch broken stone laid four inches deep—distinctly an inheritance from the turnpikes. Then through this pavement trenches were dug at four feet intervals to receive the ties, and at each end a pit was dug eighteen inches long, twelve inches wide and twelve inches deep, which was filled with rubble to form a foundation for the tie. The ties were of locust or cedar eight feet long, and seven inches in the small diameter, and were notched to receive the wooden rail. The rails were of six by six southern heart pine in lengths of from fifteen to forty feet, and were set in the notches with keys. The iron rails were 5/8 x 2¼ inches, and 15 feet long and rounded on the upper sides. At the joints they were scarfed at an angle of 60 degrees, and laid on a plate 1/4 inches thick. The nail holes were elliptical and countersunk, thus providing for expansion and contraction and allowing the nail head to be sunk below the tread of the wheel. From the figures given the cost of material for the track is seen to be as follows per foot:—

One quarter of a tie, at 35 cents plus 8 cents for notching and dressing	\$0.108
Wooden rails, 6 x 6 inch, at 6 cents per running foot	0.12
Nails, at 9 cents per pound	0.023
Iron rails, at \$58 per ton delivered	0.272
	<hr/>
	\$0.523

As turnpikes had become notoriously poor investments, private capital hesitated to embark in the new railroad field and all the early Massachusetts agitation was in the effort to have such improvements constructed by the State. But by 1834 confidence in the new form of investment had grown, and soon after, the Boston and Providence, Boston and Lowell,

and Boston and Worcester, railroads were under construction by private means.

We have traced the evolution of the railroad from the conception of a mere roadway, over which all had equal rights, to the present common carrier principle. We have also seen how the old trouble of frost, which threw the turnpikes surfaces out of shape, occupied the minds of those called upon to design the railroad tracks, when they dug so deep below the rail and filled the excavation with rubble. And we have seen how hard it was, for those accustomed to see the stages turn to one side wherever it was necessary, to conceive the passing of such stages, moving in opposite directions, when confined to a narrow track.

The right of all to use the tracks was the last of the old ideas to die. It was early demonstrated that precautions against frost were unnecessary: in fact that the resulting rigidity of foundation was an absolute disadvantage; and the question of a sufficient wear resisting surface seemed, to the directors of the Boston and Providence, to have been solved when, in an early report, they informed their stockholders that they had been able to secure a supply of rails from England which "being of iron would never wear out."

HOBBIES

BY G. W. LEE

Blessed is the man with a hobby! for he is not a slave to success; for he measures by the yardstick of eternity and not by the cost of living; for he has, with Emerson, the genius to believe that "what is true for him in his private heart is true for all men." Happy he is, though condemned as "faddist"; for, again, like our New England philosopher, he has deep joy in the certainty that "to be great is to be misunderstood." Call them by whatever name you please, I am glad to acknowledge four avocations with which I have long abided: Esperanto, trees, information bureaus, walks; and I justify each as follows:

Esperanto, because it looks upon the world as one, assuring its apostles of coaling places in distant lands, whether in Algeria or Mesopotamia, in Siberia or the antipodal Van Diemen's Land. It assures me that I could visit scores of foreign cities without having to ask who therein is worthy. And why? Simply because the word Esperanto, a word that is born of "hope," is the messenger of a common cause, and inspires an hospitality of the thirty-third degree; so that he who comes in its name is received with a "Welcome to our city!" Its *noblesse oblige* certifies an open door the world over; and so the Esperantist who happened to be my host and friend in the first place I should visit would commend me to another Esperantist in the next, who in turn would commend me to a third, and so on,—each in succession, not only helping me immediately, but paving the way for the further assistance. I could tell of such happy experience already enjoyed; but this is an essay on hobbies, and not on the international language—an occasion to be categorical, and not to indulge, over-much, in argument.

Trees, because when, years ago, a friend took me into the woods to tell me about them, there was a magic in that telling which converted me at once, and I saw that indeed "the groves were God's first temples." Since then I have considered myself introduced to all the trees that are, with an invitation to call each by its every name—its first name or its last name, its nickname or its Latin name, or, more recently, its Esperanto name,—an intimacy I should be loath to lose. Trees are an obvious delight, with their bloom in the springtime and their foliage in summer, their deep colors in the autumn and their fine sim-

plicity in winter. Furthermore, they are with us on our travels (save on the ocean or in the desert); and to read of them is a privilege to be enjoyed at all seasons and in all weathers.

Information bureaus, because they lead us into the way of truth. The information bureau, which I know in its militancy, I visualize in its triumph. You are eager to find something out, and you hardly hope for success. Are you not made exceedingly happy if unexpectedly the answer comes? Thus to give pleasant surprise is a function of the information bureau. Naturally, however, as with all things whose value cannot be assessed in dollars and cents, the promoters of this clearing house of good news are but few; and those few are welcome to their monopoly. Such paradox, the lack of competition for the best, is, of course, experienced again and again by us all.

Walking, because therein one finds himself. He that persistently walks must needs go often alone; yet his lone-ness is only a popular misconception, for he is not alone, but, like Enoch, he is with his Maker. The rhythm of the long distance swing gives that sense of harmony which all men strive for through their various means: through making money, to bring them comfort; through seeking fame, to win applause; through gaining knowledge, to enjoy superiority; through playing the good fellow, to have friends. Walking, however, transcends such effort, for it tunes man to the infinite. The football rusher who suddenly stops and deliberately kicks a goal from the field, thus scoring in the team play with his fellows, suggests how the vision of the pedestrian is a focussing of the world's work. But again, this is an essay on hobbies, and not on the life everlasting, however cognate the two may be in their disavowal of time and space.

There is, of course, a limitless variety of hobbies. One man I know has a penchant for what he calls "rubbing," which is to place over the door knob of an old-fashioned house a piece of paper, and then to scribble over that paper. The impression thus brought out is as fantastic as the knob itself, and to make and collect these impressions is his hobby. Doubtless by this means he reads the history of the age that produced each door knob; and, should you talk with him and give him a chance to expatiate, you would likely conclude that he sees a highway to salvation in the fellowship of household art.

Many a man's hobby is a vegetable garden—in times like these almost his necessity. If, however, our vegetable gardener

is by trade a banker, and if you should come to sell him, say, a book on the Income Tax, he would doubtless protest that he has "no time to talk on that matter today." Yet if today he should chance upon you while you were in the act of eating a mango (something which could not be grown in his garden, or in any other garden of this climate, except under glass), he might easily find an hour and more to talk not only of mangoes, but of all manner of fruit and vegetable, even to the cost of living and the income tax itself.

There is no predicting what entree there is through hobbies. Once upon a time, a man who was trying to interest Stone & Webster in a trolley road that might eventually have led to the top of Ararat, confessed to me (while waiting for an interview) that franchises in that far country were obtainable not through a bureau of corporations, but rather through making friends with the sultan's favorite wife; which is nothing more nor less than a parable on the means that most of humanity habitually employs in seeking what it prizes.

I am in the habit of lunching at a store so little that it reminds me of St. Dunstan's cell. The other day, at high noon, only two of us were at the counter; so I asked the lady in waiting why there were not more customers at this popular time for eating. (A few more of us would have made it crowded.) She replied, "It is Lent, and many are now taking but two meals a day." An overt act of abstinence. They were doing a good thing. Were they hobbyists? Let us ask the question in a larger way: Does going to church three times a day for three hundred and sixty-five days in the year mean a hobby of church going? Yes and no. It may indeed be an act of worship, or it may be mere sanctimony, and therein like the morning plunge, for pleasant reaction, or omission of the noonday meal at Christmas, for greater rejoicing when the goose is carved at night.

All this brings up the further and somewhat important question: how to evaluate the hobby. I may study Esperanto for a virtuous end, yet be so lured into a study of the languages from which it is compiled that, while the pleasure is keen, the applied utility is so remote as not to justify the time thus spent; any more than if one goes studiously to the theatre six nights a week, albeit in each pursuit there is the semblance of "re-creation." On the other hand, to preside at the meeting of the Esperanto Society and endeavor to hypnotize the majority of that shy assembly into speaking freely the language of the label

on the door, stretches the meaning of hobby to its elastic limit, and it might well be called the real work of sawing wood.

The subject of hobbies is worthy of study. It may be a system of philosophy by which duties that are dead become duties that are vital. At home I have the trying task of keeping accounts, and for this task I have about as much enthusiasm as Rhode Island coal has for the furnace. I have threatened, however, to make it a hobby, and thus to make it a joy; but there are others of the household who say, "Don't," and in our compromise the accounting suffers. Nevertheless, I believe my threat ought to be carried out, though with a grace that hides the machinery of self-discipline; for, like time and tide, duty is a universal law, and, after all, every man's hobby is but a scaffolding for something better—for that which it symbolizes—and the time spent thereon is for a stewardship to be accounted for. Esperanto to the four winds! if it is merely for close corporation. Tree study anathema! if it is merely the game of counting species. Perish the information bureau! if it is merely to sell luxury. And let walking be decried as time wasted! if it is merely for the indulgence of fancy.

The hobby has potentiality, and with it responsibility. Its very uplift means a downfall if the responsibility is shirked. Often a man's business is his hobby, and he must have a care not to let it get the better of him. He must see that he himself is not a victim to the very routine of gain, to the continuous vision of commercial supremacy. And as with any man, so with groups of men. Men and nations must distinguish between the "Symbol and the Reality." Phillips Brooks, in a sermon of that title, brings out finely the distinction between things we need and things we think we need, when he says, "The track of an army marching deep into an enemy's country is scattered all along with the equipage which the men seemed to find necessary when they started, but which they have learned to do without as the exigencies of their march grew greater."

An interesting question: What can we do without as the exigencies of life grow greater? I believe we can find at least a suggestion of the answer in considering the hobby in its largest aspect, from the standpoint where all hobbies converge into one. No trouble to find a list of hobbies. Peruse the pages of *Who's Who* and we shall note such as the following reported as recreations: golf, tennis, hunting, fishing, gardening, botany, photography, and what not? Most suggestive, however, was an entry

I happened upon that read, "Too old to have any now." What did the man mean? If he meant he had grasped the great truth for which his hobbies were but falsework, he had, as we say, "Arrived." And what is the great truth? I have not grasped it myself. It is doubtless an open secret, which we have not the eyes to see nor the understanding to comprehend; but I suspect it is latent in the ordinary word "communication." The hobbyist yearns to communicate, and ever keeps open to the sympathizer. The golfer wants to talk golf, the yachtsman yachting, the warrior war. When man is cut off altogether from communication, whether in the solitary confinement of the prison cell, or in a strange land whose tongue he cannot speak, or even in a gay assembly or at a summer hotel, where he "knows" no one; the oppression of loneliness may be appalling. That is the picture. To have thoughts in common is to live, and what we prize most is the thing that seems to us most universal in its essentials and in its ramifications; and when we communicate on this, all material pleasures—even tobacco, a favorite consolation of the clergy—shrivel to the vanishing point. Hence, to study our hobby in this large way, so as to make a means of communication with all men, is the game, in which we win, as we come to realize, through the playing, what a fiction is in that trite saying: we have but one life to live.

The apotheosis of the hobby, its glorification, its divine ideal, is a big subject—a subject for more of a treatise than this.

CIVILIZATION'S DEBT TO THE ENGINEER

ANSEL A. PACKARD

Much has been said regarding the part played by the man of commerce, the soldier, the statesman and countless others in the development of our present civilization, but until very recently we have heard but little in recognition of the engineer. The causes for this are many and various, and perhaps the fault is as much with the engineer himself as with those who have so long withheld their recognition of his contributions to the progress of mankind. The engineer who busies himself in the technique of his profession cannot justly complain if he fails to attain a position as a leader of men. But the remarkable achievements of engineering science, and the ever-growing tendency of the engineer to assert himself as a citizen and man of affairs must, before long, bring to him the laurels that are his due.

In times past, the discovery of new trade routes has completely changed the history of nations and the fate of their peoples; but the discoveries of our engineers during the past half-century have been of even greater importance than any trade-route discoveries. These men have given the world the telegraph, the ocean cable, the telephone and the wireless; created electric lights for our homes, cities and workshops; electric motors for our trolley cars, railroads, and factories; designed generators and transmission lines to save and make useful the otherwise wasted energy of our waterfalls. Under the hand of the engineer, the wonders of yesterday become the commonplace facts of today, and he has so surfeited the public with feats of daring and magnitude that the greatest works now excite only a passing interest. Yet let us pause for a moment and picture to ourselves where civilization would stand today without these things.

Look at the great nations of modern times,—America, England, France and Germany, and it is evident that their development has been due, not in any appreciable degree to any changes in law, politics, philosophy, or religion,—but to science and the application of science. It is only in the stagnant nations, where the cultivation of science has scarcely begun, that conditions remain in the backward state of the Dark Ages. Of course, we do not forget that the labor and thought of many

other men of vision and power were needed, men experienced in finance, commerce, and government, to render the all-essential aid required to introduce and to adapt to our daily lives the great contributions of science. But it is self-evident that without the creative work of the engineer and his ability to wield and direct the forces of nature to the service of humanity, these things could never have been brought about.

Notwithstanding the fact that only within the past few years have engineering structures come to be designed with precision, and that the machinery which plays so important a part in our present economic and industrial life is a product of the last half century, some of the greatest engineering feats were performed almost before the dawn of history. The world will never cease to wonder at such marvels as the Chinese Wall, the Sphinx, and the Pyramids. But the ancients were not producers of economic goods, as are our modern engineers, confining themselves mainly to the erection of monuments, as such.

As time went on the need of political security, public utilities, and the development of the spirit of commercialism, resulted, during the Roman era, in the construction of highways, aqueducts, and sewer systems, which for many centuries remained unsurpassed.

Despite all these achievements, however, the engineer of the past was primarily a builder without special training, relying on his judgment and common sense as guides. It remained, practically, for our own day to bring forth what may be called the new engineer: the man of commerce, industry, and business, to whom engineering is a means rather than an end. Managers and business men are being drawn in ever-increasing numbers from those engineers who can go back of stresses and voltages to the money side of things. For the engineer who can go still deeper—back of the dollars, to the public welfare—is opened the field of government administration. Certainly the men who have been the greatest factors in the creation and conservation of our material wealth and resources possess sound and constructive ideas of practical value regarding their operation and control. Their work in science and engineering, in dealing with the great forces of nature, and in handling men, makes them eminently fit to serve as leaders and protectors of the people.

The engineer is the masterful man who levels hills and

removes mountains; who changes the course of rivers, sends them through tunnels to develop electric light and power, or to convert deserts into fruitful fields; who unites oceans and revises the paths of commerce. And above all else, the real engineer must be a strong and worthy man. For, in so far as he is an engineer, he must be an open-minded and essentially truth-loving man. As the prime condition of his control over the great forces of nature, he must see things and their relative values, not as he wishes them, nor as he already thinks them to be, but exactly as they are in fact. With the facts before him, he must have the skill rightly to interpret them, and the strength and courage to make his acts conform to his decisions. At his own peril he must not deceive himself, otherwise his works will fail and he fail with them. A false theory in medicine, in law, or in theology may live—as many have lived—undetected for centuries, but a false theory in engineering is destroyed by the first attempt to put it in practice. If its embodiment be a machine, it will not work; if it be a structure, it falls to pieces.

It has been said that the lawyer thrives by our quarrels, the physician by our diseases, and the clergyman by our sins; but to the engineer, it is given to labor for our good by directing the great forces of nature to the service of mankind. In the words of Harold Bell Wright, in his story of "The Winning of Barbara Worth,"—"Some day, perhaps, when the world is much older and very much wiser, civilization will erect a monument to the memory of such men as these; but just now civilization is too greedily quarreling over its newly acquired wealth to acknowledge its debt of honor to those who have made that wealth possible."

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The manager of the companies operated by Stone & Webster writes to Stone & Webster Management Association about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Amsterdam, N. Y., February 20th:

Bank clearings for January, 1917, were \$2,263,500, against \$3,704,655 last year.

Post office receipts for January, 1917, were \$6,626, against \$7,885 last year.

Manufacturing plants continue to run at full capacity with no indications of diminishing orders. Retail trade is rather light, this month being generally considered the duller of the year.

Ballston Spa, N. Y., February 20th:

Bank clearings for January, 1917, were \$618,812, against \$557,223 last year.

Post office receipts for January, 1917, were \$1,341, against \$1,261 last year.

Business conditions are generally considered good, as are also labor conditions, and the outlook for the future is bright.

Bellingham, Wash., February 20th:

Building permits at Bellingham for January, 1917, were valued at \$39,353, against \$129,150 last year, and \$18,836 in 1915.

Post office receipts for January, 1917, were \$5,964, against \$5,536 last year.

The immediate outlook for general business is regarded as favorable, but this view is contingent on relief being obtained from the car shortage, which is seriously handicapping nearly all business in this community. Railroad men say that the shortage has very largely resulted from the unusual storms in the mountain district east of here, which have tied up great quantities of freight equipment. It will probably be March or April before it is possible to tell whether the shortage is going to continue through the year. But even with this contingency, it is general belief that business conditions will be much better than last year.

Weather conditions have been worse than the average but have been much better than last year, and business has gone along about as usual.

This is a big year for the fishing industry, and the canneries have withdrawn from the local labor market a large number of men, quite a number being sent to the Alaska canneries. The shipyards are also taking a number of good men, and general business conditions throughout the Sound District have so improved that labor seems to be drifting to the larger centers where better pay is secured.

Post office receipts at Mt. Vernon, Burlington, and Sedro Woolley combined, for January, 1917, were \$3,082, against \$2,616 last year.

It is general opinion among Skagit County business men that the business outlook for the immediate future is much better than for some time past. This opinion is based upon the somewhat large increase as compared with a year ago, and on the increased activity in all lines of business.

The receipts of our company were better than a year ago, due to the better weather conditions and the general improvement in business.

There is a large condensery being built at Mt. Vernon and the new line of the Clear Lake Lumber Company is opening up much new timber, resulting in a larger population and a bigger payroll. At Sedro Woolley, the Skagit Steel & Iron Company has recently installed an electric furnace.

The outlook for the lighting and small power business in Skagit County for the next few months is very favorable.

Brockton, Mass., February 19th:

Bank clearings for January, 1917, were \$13,889,335.

Savings banks deposits in January, 1917, were \$14,462,130, against \$12,801,930 last year.

During January, 1917, 24 building permits were issued, valued at \$37,505, against 21 last year, valued at \$50,950.

Post office receipts for January, 1917, were \$24,887.

During January, 1917, shoe shipments amounted to 62,780 cases. This was 11,000 cases less than the previous year, but the last week in January showed the largest shipments, indicating an increase in business.

The W. L. Douglas Shoe Company is to make a million dollars' stock issue for the purpose of increasing its large number of shoe stores. This will make its total stock issue \$2,500,000.

Canastota, N. Y., February 20th:

Bank clearings for January, 1917, were \$119,566, against \$97,295 last year.

Post office receipts for January, 1917, were \$1,009, against \$1,206 last year.

Columbus, Ga., February 21st:

Bank clearings for January, 1917, were \$1,703,101, against \$2,024,030 last year.

During January, 1917, 3 building permits were issued, valued at \$3,600, against 3 last year, valued at \$94,200.

Post office receipts for January, 1917, were \$8,025, against \$7,412 last year.

The mills are somewhat puzzled over the outlook and are curtailing their output, some of them having discontinued running at night. This is due to the slump in cotton, but it is believed that the situation will not last very long.

The extremely cold weather experienced during the past few weeks has hurt the oats crop and damaged early vegetables. On the other hand, the cold weather has made the retail trade quite brisk.

The receipts of the Columbus Power Company for January, 1917, showed a very gratifying increase over the previous year.

Dallas, Tex., February 8th:

During January, 1917, 109 building permits were issued, valued at \$604,477, against 97 last year valued at \$771,630.

Real estate transfers for January, 1917, were \$3,518,375, against \$1,937,886 last year.

Post office receipts for January, 1917, were \$119,218, against \$101,432 last year.

Local real estate people are looking forward to unusual activity in real estate this spring. "The employment of labor is normal in all branches and the outlook is quite satisfactory for the first half of 1917, especially in the building trades" is a statement contained in the last Dallas Federal Reserve Bank report. Usually the season immediately following the holiday period is followed by a distinct lull in business. The falling off this year has been less noticeable than usual, and so far as local conditions are concerned it is predicted that 1917 will be a year of great prosperity.

The possibility of war has had no other apparent effect than to reduce the price of cotton, and even this has reacted, the prevailing quotation now being around 16 cents in the Dallas market, as compared with less than 12 cents a year ago. As an evidence that the prosperity overshadows the war possibility, the directors of the American Exchange National Bank decided yesterday to proceed immediately with the construction of their new proposed bank building. The plans call for a sixteen-story fireproof building.

The heaviest snowfall for many years completely covered North Texas on Sunday, January 14, 7.1 inches being recorded by the local weather bureau station. The snowfall insures a fine season for the preparation of the spring crops. It came at the right time and was particularly beneficial to the winter wheat and oats crops.

The receipts of our railway department for January, 1917, showed an increase of 15.4 per cent over the previous year. During the past month, the number of jitneys fell off considerably.

The receipts of the Lighting company for January, 1917, were 15.7 greater than for January, 1916, establishing a new record for the company.

El Paso, Tex., February 14th:

Bank clearings for January, 1917, were \$17,113,308, against \$9,394,338 last year.

During January, 1917, 163 building permits were issued, valued at \$407,107, against 114 last year, valued at \$312,077.

Post office receipts for January, 1917, were \$36,581, against \$22,069 last year.

Exports for January, 1917, were \$208,391, against \$325,072 last year.

Imports for January, 1917, were \$140,900, against \$65,920 last year.

El Paso's trade relations with Mexico continue to suffer on account of the revolutionary activities.

Everett, Wash., February 13th:

During January, 1917, 16 building permits were issued, valued at \$11,975, against 17 last year, valued at \$12,005.

Post office receipts for January, 1917, were \$7,103, against \$6,406 last year.

Orders and prices in the lumber business continue to be very satisfactory, but the car situation is still a serious one. Some of the local mills state that they are getting only about 50 per cent of their requirements in cars, and it is said that some of the country mills have either had to shut down entirely, or else run to about 25 per cent of their capacity.

One of the recent additions to the industrial plants of Everett is the Washington Creosoting Works and Timber Drying Industry, which has just started up and has already shipped several carloads of its products.

Announcement has been made that the shipbuilding plant which recently located here is also ready to start operations. It expects to confine itself to wooden vessels.

Fall River, Mass., February 6th:

Bank clearings for January, 1917, were \$8,729,356, against \$7,006,046 last year.

During January, 1917, 36 building permits were issued, against 27 last year:

Post office receipts for January, 1917, were \$15,110, against \$14,626 last year.

Cotton cloth sales for the past month have been small, due not only to the fact that it is the dull season of the year, but perhaps also to the unsettled conditions in the cotton market.

The business of the Fall River Gas Works Company continues to increase.

Fort Madison, Ia., February 5th:

Bank clearings at Fort Madison for January, 1917, were \$1,602,798, against \$1,188,462 last year.

Post office receipts at Fort Madison for January, 1917, were \$2,386, against \$2,136 last year.

Bank clearings at Dallas City for January, 1917, were \$396,620, against \$357,144 last year.

Post office receipts at Dallas City for January, 1917, were \$425, against \$412 last year.

The retail merchants in Fort Madison report a fair volume of business during the month of January. The Santa Fe shops are particularly active and the construction of the new buildings for the American Fork & Hoe Company is providing work for such surplus labor as there is in the city. The Scheaffer Pen Company is working to capacity and contemplates considerable expansion in order to meet the demand for its product.

While very little residence building is at present in progress, it is believed that a considerable number of houses will be erected in the spring, and a prominent contractor is authority for the statement that 1917 will be the biggest building year that the city has experienced. The most important building plan is that of the new paper mill for Montgomery

Ward & Company. The Perfection Tire and Rubber Company is also considering the completion of the second unit, the foundations for which were laid two years ago.

The retail merchants in Dallas City report a fair volume of business during January. The Bennington Brothers Manufacturing Company is very active and the Burg Carriage Company is widely advertising the establishment of an automobile refinishing department.

Fort Worth, Tex., February 3rd:

Bank clearings for January, 1917, were \$47,317,409, against \$36,-884,088 last year.

During January, 1917, 64 building permits were issued, valued at \$97,986, against 55 last year, valued at \$91,137.

Post office receipts for January, 1917, were \$43,234, against \$33,831 last year.

The January report of the stockyards showed receipts of 93,796 cattle, against 45,898 last year; calves, 7,308, against 2,848; hogs, 150,707, against 86,180; sheep, 14,984, against 15,138, and horses and mules, 7,953, against 4,857.

The good business conditions which characterized the latter part of the year 1916 have been continued throughout the month of January, 1917, with very little change. We have had rather more than the usual amount of cold and disagreeable weather, and on the 14th of January, there was a snowfall of 8.2 inches, the heaviest on record for this region. The effect of the snow was rather depressing for a few days for some lines of business, but it made the farmers feel good, as the absence of the usual winter rains left the soil very dry.

Our railway receipts for January, 1917, showed an increase of 14 per cent over last year. This favorable showing was due in part to the healthy conditions prevailing and in part to the absence of jitney competition for the first time since 1914. On January 1, an ordinance went into effect forbidding jitneys to operate on Main and Houston streets in Fort Worth. Under these restrictions, only a few jitney operators took out new licenses and these have since ceased operating and have applied for refund of their license fees.

Reports from Cleburne are to the effect that no important change in business conditions occurred during the month just closed. The receipts of the Tarrant County Traction Company for January, 1917, showed an increase of 9 per cent over last year.

Galveston, Tex., February 10th:

Bank clearings for January, 1917, were \$24,198,662, against \$16,630,-434 last year.

The volume of business transaction in January, 1917, was \$127,679,-000, against \$93,147,000 last year.

During January, 1917, 86 building permits were issued, valued at \$19,458, against 209 last year, valued at \$137,000.

Post office receipts for January, 1917, were \$15,346, against \$15,817 last year.

Business conditions in Galveston are still unsatisfactory, although

cotton and wheat shipments during January, 1917, showed a slight improvement over those of the corresponding month of 1916. Last month, 361,931 bales of cotton were shipped from this port, as compared with 189,466 bales a year ago, an increase of 172,465 bales. Wheat shipments for January, 1917, were 3,163,774 bushels, against 2,262,100 bushels last year.

Lack of ships has resulted in restrictions on Galveston's grain traffic. Embargoes on wheat and corn destined for this port, whether for export or for local consumption, were ordered by the Galveston Bay lines, effective January 31. These embargoes are due to the accumulation of loaded grain cars now in the local yards.

Ships that should have sailed in the past few days have been held in port by the submarine activities about the British Isles, and if these activities continue it is doubtful if many ships leave this port for the allied countries.

Glens Falls, N. Y., February 20th:

Bank clearings for January, 1917, were \$1,158,664, against \$1,500,574 last year.

Post office receipts for January, 1917, were \$5,984, against \$4,916 last year.

The mills and factories in Glens Falls and vicinity are still running at full time. There seems, however, to be some let up in retail business, although merchants claim that business is good for this time of year.

Haverhill, Mass., February 20th:

The Haverhill Savings Banks report deposits for January, 1917, as \$13,967,313, against \$12,961,489 last year, an increase of 7.76 per cent.

During January, 1917, 14 building permits were issued, valued at \$41,300, against 13 last year, valued at \$25,200.

General business conditions continue good.

Houghton, Mich., February 7th:

Post office receipts for January, 1917, were \$3,159, against \$2,841 last year.

The output of the copper mines for January, 1917, is estimated at about 27,500,000 pounds. The copper mines are still getting out every pound of copper possible. In January, the total amount of money paid out in wages, with the exception of bonus, was greater than that paid out in December, 1916.

The enormous earnings of the copper companies and the high wages paid have very favorably affected the earnings of both the Lighting and Traction companies. The Traction company showed an increase of 23 per cent for the month.

Houston, Tex., February 10th:

Bank clearings for January, 1917, were \$59,198,157, against \$42,178,400 last year.

During January, 1917, 228 building permits were issued, valued at \$290,282, against 234 last year, valued at \$338,159.

Real estate transfers for January, 1917, were \$2,548,871, against \$910,736 last year.

Post office receipts for January, 1917, were \$61,642, against \$50,899 last year.

General business conditions were, on the whole, good during the month of January. Retail trade made a fine recovery from the lull immediately following the holidays.

The January sales of the lumber trade have broken all records and the outlook for 1917 is declared by everybody to be good.

The farmers in the vicinity of Houston have had ample time to prepare their grounds for spring planting, as the result of the small amount of rainfall. The president of the Sinclair Oil & Refining Corporation has announced that the Crystal Oil Company, which is affiliated with the Sinclair interests, has placed a contract for the construction of a pipe line to Houston which will cost in the neighborhood of \$5,000,000.

Jacksonville, Fla., February 13th:

Bank clearings for January, 1917, were \$16,104,994, against \$14,512,894 last year.

During January, 1917, 60 building permits were issued, valued at \$166,012, against 57 last year, valued at \$123,790.

Exports for January, 1917, were \$108,861, against \$45,298 last year.

Imports for January, 1917, were \$226,987, against \$38,467 last year.

Lumber shipments for January, 1917, were 33,591,510 feet, against 36,143,135 feet last year.

January showed a decided improvement in general business over the previous year. There was an unusually large number of tourists in the city during the month. It is believed that general business will continue to show improvement.

Keokuk, Ia., February 6th:

Post office receipts for January, 1917, were \$7,613, against \$6,861 last year.

General business conditions are exceptionally good among the wholesale houses, but the retail business showed a slight falling off, though there was an improvement over the same month last year.

Key West, Fla., February 3rd:

Post office receipts for January, 1917, were \$2,636, against \$2,042 last year.

Customs receipts for January, 1917, were \$35,699, against \$36,046 last year.

The cigar output for January, 1917, amounted to 6,057,483 cigars, against 1,966,957 last year.

The cigar factories are employing as many workers as can be secured and the statements of the various managers indicate that 500 additional men could be taken on if available.

Both our railway and lighting receipts for January, 1917, showed increases over last year.

Lake George, N. Y., February 20th:

Post office receipts for January, 1917, were \$546, against \$352 last year.

General business during January was about on a par with ordinary years. The outlook is good, as the real estate agents are receiving inquiries about cottages both for rent and sale.

Lowell, Mass., February 10th:

Bank clearings for January, 1917, were \$4,897,879, against \$4,442,891 last year.

During January, 1917, 32 building permits were issued, valued at \$110,670, against 26 last year, valued at \$160,050.

Post office receipts for January, 1917, were \$19 689, against \$18,795 last year.

All the manufacturers in Lowell and the surrounding country are fully supplied with orders and there has as yet been no decrease in the prosperous business conditions.

Our company is continuing its large sales of power current and business in the mercantile section of the city is very good. We are selling a large number of household utensils and securing a large number of new customers, among them being approximately 75 old houses wired for electric light during January.

Onelda, N. Y., February 20th:

Bank clearings for January, 1917, were \$466,238, against \$267,922 last year.

Post office receipts for January, 1917, were \$3,375, against \$2,827 last year.

During January, 1917, there was no change of importance in the general business situation.

Paducah, Ky., February 6th:

Bank clearings for January, 1917, were \$5,591,564, against \$3,933,514 last year.

During January, business conditions in this city were exceptionally good, the ordinary slackness following Christmas trade not being as noticeable as usual. Possibly this was due to a marketing of a portion of the tobacco crop at very high prices. Unfortunately the price of tobacco has dropped in the last few days, owing to changes in the international situation.

Considerable optimism prevails among all classes of business men with respect to Paducah's future. Strong efforts are being made to induce the government to locate the new armor plant in this city. Representatives of the city have recently been in Washington and have filed a brief setting forth the advantages of Paducah for a plant of this character. In addition, the city has employed a consulting engineer to go over the situation, carefully prepare a statement of Paducah's advantages, and act as a spokesman for the city when the naval committee makes its tour of inspection.

The efforts in connection with the armor plant have been considered

by the Board of Trade and at present three of its representatives are in Detroit conducting an advertising campaign for the purpose of securing manufacturing plants.

The receipts of the Paducah Traction Company for January, 1917, showed an increase of $5\frac{1}{2}$ per cent over the previous year. The receipts of the Paducah Light & Power Company also showed an increase.

Pawtucket, R. I., February 6th:

The banks report an increase of 40 per cent in their commercial accounts for January, 1917, and an increase of 17 per cent in savings accounts.

During January, 1917, 3 building permits were issued, valued at \$99,200, against 9 last year, valued at \$17,070.

Post office receipts for January, 1917, were \$14,758, against \$14,208 last year.

General business conditions still continue to keep everybody and everything moving as rapidly as possible to fill orders in hand, and the cry for skilled and unskilled labor continues to be heard on every side. All the mills are working to capacity and many manufacturers of textile machinery are sold out for the year. Reports from manufacturers of cotton goods, yarns, silks, laces, narrow fabrics, etc., indicate orders in hand sufficient to keep the mills busy for many months to come.

The iron and steel industry was never in better condition.

Merchants report satisfactory increases over January of last year, and see good prospects for months to come.

During January, 1917, the sales of our gas department increased 8.5 per cent and those of the electric department 16 per cent.

Pensacola, Fla., February 7th:

During January, 1917, 146 building permits were issued, valued at \$12,667, against 112 last year, valued at \$53,123.

Post office receipts for January, 1917, were \$6,806, against \$7,395 last year.

Exports for January, 1917, were \$1,547,776, against \$388,842 last year.

The general business outlook for the new year is considered very satisfactory.

Both our lighting and our railway receipts for January, 1917, showed an increase over the previous year.

Ponce, Porto Rico, February 13th:

Post office receipts for January, 1917, were \$2,789, against \$2,112 last year.

It is difficult to outline the future of general business conditions in the immediate future, owing to the complicated foreign situation. International complications in which the United States found itself involved would be likely to affect Porto Rico unfavorably. If the status quo is maintained, to say nothing of an improvement in the feeling existing between the two hemispheres, the feeling here should be rather optimistic as regards business. At present, general business is good.

The sugar shipments from Ponce for January, 1917, were 7,253,622 pounds, valued at \$368,189. The coffee shipments were 2,477,970 pounds, valued at \$357,543. The tobacco shipments were valued at \$94,469.

Port Arthur, Tex., February 17th:

During January, 1917, 38 building permits were issued, valued at \$33,321, against 68 last year, valued at \$45,401.

Post office receipts for January, 1917, were \$4,663, against \$3,956 last year.

Exports of the Sabine District for January, 1917, were \$4,301,541, against \$2,350,685 last year.

Imports for the Sabine District for January, 1917, were \$108,613, against \$97,241 last year.

Custom house receipts for January, 1917, were \$6,021, against \$3,071 last year.

The general business outlook for the immediate future is excellent and the outlook for our company appears to be very satisfactory.

Reno, Nev., February 16th:

Bank clearings for January, 1917, were \$2,108,695, against \$1,297,156 last year.

Building permits for January, 1917, were valued at \$3,100, against \$500 last year.

Post office receipts for January, 1917, were \$6,539, against \$7,916 last year.

General business conditions continue good for Reno and Sparks. There is a considerable amount of new construction planned for this spring, including a business block and a large apartment house. Yerington and Mason are flourishing with the reopening of the mines and the smelter.

The first furnace of the Mason Valley Mines Company was blown in on February 12, resulting in an increase of our station peak. We have been officially advised that the second furnace of the smelter will be blown in not later than March 15. The coke shipments for the smelter, which have been generally delayed, are now moving along smoothly.

The new railroad connecting the Bluestone Mine with the new Copper Belt Railroad is progressing rapidly. The grading has been completed throughout, and the ties and the rails have been laid for about one-third of the total length. It is probable that this line will be finished between March 1 and March 15, after which time the Bluestone Mine will maintain shipments of 12,000 tons or more per day to the smelter. This will result in an increased power load.

We have also been notified that the Mexican mill will resume operations about February 21 after having been closed for over four months. This will also mean an increase in our power load.

From the above it will be seen that at the present writing, the general outlook for our company for the next few months is such that our principal concern is not for our earnings but for our ability to supply the demand.

Saratoga Springs, N. Y., February 20th:

Bank clearings for January, 1917, were \$487,224, against \$327,851 last year.

Post office receipts for January, 1917, were \$4,474, against \$4,724 last year.

Savannah, Ga., February 13th:

Bank clearings for January, 1917, were \$21,967,701, against \$23,321,-479 last year.

During January, 1917, 50 building permits were issued, against 41 last year.

Post office receipts for January, 1917, were \$27,676, against \$26,424 last year.

Cotton receipts for January, 1917, were 39,030 bales, against 101,336 bales last year.

Resin receipts for January, 1917, were 21,884 barrels, against 29,512 barrels last year.

Turpentine receipts for January, 1917, were 3,239 barrels, against 7,251 barrels last year.

General business is continuing to show some improvement.

The receipts of both our railway and our light and power departments for January, 1917, showed an increase.

Seattle, Wash., February 8th:

Bank clearings for January, 1917, were \$69,318,137, against \$50,997,-533 last year.

Building permits for January, 1917, were valued at \$500,225, against \$236,040 last year.

Real estate transfers for January, 1917, were \$1,074,720, against \$762,834 last year.

General business conditions in January were gratifyingly good in all lines, particularly in the retail trade, which is feeling the impetus of the heavy payrolls created by the shipbuilding industry and allied manufacturing.

Sydney, Nova Scotia, February 24th:

During January, 1917, 1 building permit was issued, valued at \$2,800, against 2 last year, valued at \$3,000.

Custom receipts at Sydney for January, 1917, were \$30,872, against \$23,475 last year.

The output of the Dominion Coal Company for January, 1917, was 318,294 tons, against 373,416 tons last year, and shipments were 266,068 tons, against 295,925 tons last year.

The general industrial and mercantile situation throughout Cape Breton has changed very little during the last few months, the acuteness of the labor situation, if anything, increasing.

The Merchants Bank of Canada has opened a branch in Sydney.

There has recently been a pronounced endeavor to enforce the Provincial Nova Scotia Temperance Act, which, if it is accepted, will result in an appreciable increase in the output of the steel plants and the collieries.

Unusually low temperatures have prevailed in Cape Breton during

the latter part of January and February, and the fall of snow has been above the average.

The business of our lighting department continues to show satisfactory increases. The Dominion Iron & Steel Company has given a contract for the wiring of all its houses in Sydney not previously wired.

Tacoma, Wash., February 8th:

Bank clearings for January, 1917, were \$10,883,745, against \$7,638,139 last year.

During January, 1917, 95 building permits were issued, valued at \$78,751, against 80 last year, valued at \$33,154.

Real estate transfers for January, 1917, were \$156,957, against \$162,373 last year.

Post office receipts for January, 1917, were \$26,792, against \$21,978 last year.

Preliminary work has been begun on the Todd Shipbuilding plant on the tide flats, details of which were given in a previous letter.

The plans are well under way for the establishment of the army post on American Lake, details of which have also been previously given.

Tampa, Fla., February 13th:

Bank clearings for January, 1917, were \$5,268,475, against \$4,615,072 last year.

Building permits for January, 1917, were valued at \$77,861, against \$65,040 last year.

Post office receipts for January, 1917, were \$26,363, against \$21,888 last year.

Customs receipts for January, 1917, were \$211,088, against \$142,494 last year.

Internal revenue receipts for January, 1917, were \$94,830, against \$60,006 last year.

The value of water commerce for January, 1917, was \$3,283,793, against \$2,582,819 last year.

During January, 1917, 28,831,640 cigars were manufactured, against 15,380,000 cigars last year.

The indications are for continued prosperity in the cigar manufacturing industry.

Our railway earnings for January, 1917, showed an increase of 3.65 per cent over last year, and our lighting earnings an increase of 9.66 per cent.

Watervliet, N. Y., February 20th:

Post office receipts for January, 1917, were \$2,235, against \$1,741 last year.

Building in Watervliet is practically at a standstill. Factory conditions, however, are excellent. Most of the factories are running at full capacity.

Woonsocket, R. I., February 13th:

During January, 1917, 14 building permits were issued, valued at \$31,975, against 2 last year, valued at \$5,000.

Business conditions continue excellent. All of the mills are working full time, and merchants report exceptionally good business.

The labor situation, while somewhat better than last fall, is still unsatisfactory. Many of the mills are advertising extensively for help, and it is thought that in the spring the scarcity of labor will be greater than last summer.

The receipts both of our gas and electric departments for January, 1917, showed an increase over the previous year.

News from the Companies

Boston Office

Mr. Francis J. Hovey, who for the past five months has been ill at his home at Hingham, Mass., has recently gone to the Corey Hill hospital, Brookline, Mass., where, it is hoped, his recovery will be more rapid.

Mr. Montello C. Smith has been appointed local manager of Brockton and Plymouth Street Railway Company.

Mr. G. W. Lee is to give an illustrated lecture at the Boston Public Library Lecture Hall on the evening of Thursday, April 12, on "Greater Boston as an Arboretum."

Mr. R. C. Shepard, formerly assistant treasurer of the The Key West Electric Company, has been transferred to the office of the treasurer of the Management Association.

Mr. B. H. Campbell, a graduate of Dartmouth College, and of the Tuck School, '16, has joined the office of the treasurer of the Management Association.

Mr. E. L. Patterson, formerly of the office of the treasurer of the Management Association, has joined the accounting staff of the American International Corporation at their New York Office.

Mr. Edward Reynolds, Jr., of the treasurer's office, has been transferred to the accounting department of the Savannah Electric Company.

New York Office

A dinner of the members of the New York office was held in the "Yacht Room" of the Hotel Astor on Friday, February 16.

The presence of substantially all of the members of the office who were in New York at the time afforded an opportunity for the general discussion of the individual and collective purposes of the New York office. Each man was called upon for a short talk on his work, and a broader picture of the working of the whole organization and its various departments was presented by Mr. Charles A. Stone, Mr. Henry R. Hayes, Mr. Howard L. Rogers and Mr. George O. Muhlfeld.

The guest of the evening was Mr. I. W. McConnell, who gave an interesting and instructive illustrated talk on his recent trip to various South American countries.

Those present included:

Charles A. Stone
I. W. McConnell
Henry R. Hayes
Howard L. Rogers
George O. Muhlfeld
Joseph S. Lovering
T. T. Whitney, Jr.
O. E. Stevens
Royce W. Gilbert
Arthur B. Griffin
Chester M. Clark

H. McC. Bangs
A. Stanley Ford
F. E. Hatch
R. Saffung
T. F. Stewart
L. O. Edwards
F. S. Ritchie
R. P. Arthur
W. J. Anderson
L. E. Storm
M. F. Broderick
H. B. Hunter
John H. Lord
J. A. Dailey
John E. Murray

Baton Rouge, La.

Figures compiled by the United States post office here, closing up the 1916 records, show an increase of \$4,000 in stamps sold and \$82,000 in money orders purchased over the year 1915.

The new ferry boat, "City of Baton Rouge," has been put in service and is now operating on a fifteen-minute schedule between Baton Rouge and Port Allen. This improvement in service is greatly appreciated by the public. The new steamer was built especially for ferry service here and will accommodate at least 675 passengers. It has the latest improved engines and electric fixtures.

The Louisiana National Bank is making extensive improvements to its vault and office equipment, which will cost approximately \$15,000.

The Mercantile Bank of this city, which was organized the first of this year, recently purchased the \$125,000 issue of School Improvement bonds, and the Louisiana National Bank purchased the \$130,000 issue of road bonds of Road District No. 2. Both of these issues were sold to local banks at a very much higher price than were offered by any of the out-of-town bidders.

Mr. E. B. Powell of the Engineering Corporation spent a few days in Baton Rouge recently.

On February 13 the employees of the Baton Rouge Electric Company gave a supper at the Istroume Hotel in honor of Mr. Donald Stewart, retiring manager, and Mr. I. Maxwell Stover, new manager of the company. The occasion afforded a fine opportunity for all departments to get together in greeting the new manager.

Mr. Stewart and family will shortly move to New London, Conn., where Mr. Stewart will occupy the position of general superintendent. Both Mr. and Mrs. Stewart will leave many friends in Baton Rouge.

Mr. T. W. Neff, a graduate from the Louisiana State University, has been made assistant to superintendent of gas department.

Columbus, Ga.

The annual meeting of the Electric City Benefit Association was held on December 21, 1916. The report of the officers showed the affairs of the

association to be in a good condition, there being on hand in the treasury some \$2,218. Mr. G. A. Woods was re-elected president. The following directors were elected at this meeting: C. M. Young, MacD. Dexter, A. A. Wilbur and W. F. Breese. At the meeting of the directors, Mr. C. M. Young was elected vice-president, L. H. Crowell, secretary, and A. A. Wilbur, treasurer.

Mr. R. M. Harding recently returned from an extended stay at the Boston office.

Mr. Harding, together with Mr. Breese, our trainmaster, spent a week in Pensacola during the latter part of January, investigating conditions and the methods used by that company in the operation of its system.

Mr. E. T. Smith has been made master mechanic at our car barn, having been transferred from the Pensacola company.

Mr. G. B. Muldaur, field secretary of the National Electric Light Association, recently paid us a visit and revived the Company Section of the N. E. L. A. At a meeting of the Company Section some twenty enrolled as members, and the following officers were elected: G. Willis Radcliff, chairman; Michael J. Fox, secretary; and A. A. Wilbur, treasurer. Mr. C. M. Young was elected chairman of the committee of ways and means.

The regular teacher in the department of applied electricity in our Industrial High School having resigned to take up other duties, members of our organization filled this department from day to day. Mr. H. W. Patterson, a graduate of Georgia Tech, and Mr. W. P. Christian, a graduate of Auburn, together with Messrs. Young, Dexter, Hutchins and Mr. Muldaur of the N. E. L. A., carried on this work for the school.

The Power Company has recently installed at our steam station a new 1000 kilowatt motor generator set. This will give us more capacity to take care of heavy travel on our cars.

The annual meeting of the Columbus Chamber of Commerce took place and a new board of directors was elected. This board elected Mr. A. F. Kunze, president of the Columbus Office Supply Company, as president of the Chamber for the coming year. It also accepted the resignation of Mr. Leland J. Henderson, who has been secretary for three years, but as yet has not named his successor. At the annual membership council luncheon Mr. John S. Bleecker was elected chairman for the coming year. Many activities have been outlined. One of the chief activities is the inauguration of an annual fair. The Chamber of Commerce has commended the idea and is using its influence to effect a Fair Association.

Mr. G. W. Radcliff, of our commercial department, was unfortunate in having his house burned down during the latter part of January.

The annual barbecue given by the company to the members of the organization was held at the car barn on the night of February 1, 1917. The ladies of the organization, together with the wives of some of the members, participated in the barbecue previous to the main event. The ladies had as a guest Mr. J. Warren Kerrigan, who was appearing in a local movie show. Practically all of the members of the organization attended this barbecue, after which talks were made by Manager John S. Bleecker, R. M. Harding, Frank U. Garrard, A. S. Bradley and others. Mr. C. M.

Young acted as master of ceremonies in his usual excellent manner.

On January 1, Mr. W. H. Speer, who has been in our accounting department for a number of years, left us to take up his new duties of tax receiver for the county.

Fort Madison, Ia.

The Continental Machine & Foundry Co., successor to the Larsen Ice Machine Co., has discontinued operation. There are several possible purchasers for the factory building and equipment, and it is not believed that the industry will be lost to the community.

The Perfection Tire & Rubber Co. is gradually increasing its output and is now shipping about fifty tires a day.

Work has been begun on the buildings for the Montgomery Ward Co., which proposes to operate a paper mill near the Brown Paper Co. plant.

The new factory buildings of the American Fork and Hoe Company are under construction and should be completed by early spring.

The ice harvest from the Mississippi river has exceeded that of the last ten years. The ice is of a very good quality and large shipments have been made from Fort Madison to St. Louis and elsewhere.

A. S. Nichols, manager, was re-elected president of the Fort Madison Commercial Club at the annual meeting held in February.

On January 29 the business men of Fort Madison attended a very successful banquet given under the auspices of the Commercial Club. Mr. C. W. Kellogg was among those invited, but it was not possible for him to attend.

It is understood that the Sinclair Oil Company has completed its purchase of the right of way through Fort Madison.

Jacksonville, Fla.

Mr. Ralph E. Forbes, one of the board of directors of our company, paid us a visit recently.

Superintendent B. T. Longino has returned from a hurried visit to his home in Fairburn, Ga.

Mr. E. B. Powell, power station betterment engineer, of the Boston office, visited the local company in the early part of February.

Rear Admiral John V. B. Bleecker, U. S. N., was a recent visitor at the local offices. Rear Admiral Bleecker is the father of Manager J. S. Bleecker, of the Columbus Electric Company.

Mr. G. L. Hall, student in the power station, has returned from a visit to his home in Melrose, Mass.

Mr. Thomas R. Lannon has become connected with the company as student in the transportation department.

The regular monthly meeting of the Safety First Committee was held February 12. Every department of the company was represented, and the several suggested safety measures were fully discussed.

The large Carpenter-O'Brien saw mill near this city is now operating with day and night shifts. This sawmill, which employs upward of five hundred men, has a daily output of 6,000,000 feet of yellow pine lumber.

Jacksonville is now the largest naval stores market in the world, outstripping by far any other market for this commodity.

One of our old cars has been put to a novel use. A local theatre chartered the car and attached bill-posting boards containing advertising matter to the outsides for the full length of the car. The car was then operated through the streets and proved an effective advertising medium.

The barge "Satilla," with a 1500-ton coal cargo from Norfolk, for the power station, was unloaded about February 1.

Keokuk, Ia.

On January 20, an enthusiastic reception was given by the Keokuk Industrial Association to members of the Greater Iowa Association, who arrived by special train, reaching Keokuk at 7 P.M. Dinner was served at the Hotel Iowa to guests from Fort Madison, Burlington, Davenport, Ottumwa, Des Moines and other Iowa cities. Keokuk was the last stopping point on a trip made over the entire state, with the idea of promoting a spirit of closer co-operation to advance the interests of a Greater Iowa.

Keokuk is still endeavoring to secure favorable consideration as a site for the proposed government armor plate works. On January 31, Mr. C. F. McFarland, retiring president of the Industrial Association, presented to the Armor Plant Board in Washington a summary of the natural advantages of Keokuk for such an industry. Final decision is being withheld pending an inspection trip by the committee to various points under consideration.

Company L, of the First Regiment Iowa National Guard, returned to Keokuk from the Mexican border on January 15. A banquet in their honor was given by prominent business men of Keokuk, on January 18, at the Hotel Iowa. Addresses were made by leading citizens and reminiscences of camp life were given by members of Company L. The consensus of opinion seemed to be that the training secured on the border would prove of material value to the individual members of the company and as a step toward preparedness for such emergencies as may develop.

The High Tension Club gave a very successful dancing party at the Elk's club house in Keokuk on February 16. Nearly two hundred couples, including members of the club and invited guests, were present. Dancing began at 8:30 P.M. and continued until shortly after midnight, Agne's orchestra providing the music. A special feature of the evening was an illuminated Triskelion displayed to advantage during the grand march. The general comment indicated that the dance was one of the most enjoyable affairs yet arranged under the auspices of the club.

Mississippi River Power Company

On February 10, the lock, dry dock and government grounds were closed to visitors by orders of the United States War Department. Sentry houses have been placed at the main entrance to the works on Water street and also at the foot of the Fulton street steps. No visitors are admitted to the power station except when provided with a written permit. Passes have been issued to all employees whose duties require access to the plant through the government premises.

A contract has recently been executed with the Electric Smelting & Reduction Company, covering the delivery of electric power to a furnace plant which is to be built during the coming summer at Hamilton, Ill.,

near the east end of the dam. Ferro-manganese will be the product of this new industry and 3,000 kilowatts will be the initial connected load.

On February 14, Mr. C. W. Kellogg, manager, Mr. A. W. O'Harra of legal counsel and Mr. R. H. Bolster, hydraulic engineer, were in Washington, D. C., to attend a hearing before the Rivers and Harbors Committee with reference to impounding water behind the Keokuk dam.

Construction of the Niota pumping station has recently been completed, and the equipment installed is now in satisfactory operation, taking care of the present pumping requirements of the district. The two motor driven ten-inch centrifugal pumps, each capable of discharging 3200 gallons of water per minute, are provided with such automatic equipment that occasional inspection is the only attendance required, thus reducing operating expense to a minimum.

On February 2, Mr. P. B. Williams, chief clerk, was transferred to the auditing department of the Boston office. Mr. J. T. Wycoff, connected with the local accounting department since the beginning of operation, has been promoted to the position of chief clerk.

Keokuk Electric Company

Mr. H. A. Turner, electrical superintendent, Mr. C. C. Buffum, line foreman, and Mr. R. R. Ralston, commercial agent, have completed preliminary surveys in Montrose, prior to supplying this town with electric current.

Mr. Anson L. Berryman was promoted on February 1, to the position of chief clerk of the accounting department, succeeding Mr. Paul Newell, resigned.

The Car Men's Club held its monthly meeting on Saturday night, February 10.

Mr. J. P. Ingle, manager, recently made a short business trip to St. Louis and Des Moines.

Mr. Charles Deter, formerly of Houghton, Mich., arrived in Keokuk on February 5, to assume the duties of assistant chief clerk of the accounting department.

Mr. C. C. Buffum, line foreman, has just returned from an enjoyable trip to his home in the Twin Cities, Minneapolis and St. Paul.

Key West, Fla.

R. C. Shepard, our assistant treasurer, spent a few days in Havana during the middle of January.

Work on the Gas White Way on Duval street has been started.

The U. S. S. "Columbia," flagship of the submarine force, with Rear Admiral Grant, commander-in-chief, spent several days in the harbor the latter part of January.

While here, the U. S. S. "Columbia," "Bushnell," "Tallahassee" and "Osark," accompanied by submarines K-1-5-6 and L-2-3-9-10 and 11, were at Tortugas for torpedo practice.

January was the most prosperous year in the cigar industry in the history of the city.

January was much warmer than the normal January, averaging a daily excess of about four degrees. The highest temperature, 81 degrees, occurred on the 28th, and the lowest, 57 degrees, was recorded on the 12th.

The total rainfall for the month was only .14, giving a deficiency of 1.84 inches, as compared with the normal, and excepting 1907, when .11 of an inch fell, the current January was the driest in 47 years. Sunshine was recorded on every day during the month.

Work is progressing rapidly on the biological station at the head of the Island. This station will be an important addition. Three similar stations are now maintained by the Department of Commerce, at Beaufort, S. C., Wood's Hole, Mass., and Fairport, Iowa. The selection of Key West as a site for the Gulf Station was due to the equitable climate, purity of the sea water, and the greatly varied specimens of fish and other forms of marine life to be found in this vicinity.

On February 1st, at 1:47 P.M., the first words were spoken over the long distance telephone between Key West and Miami, and a short time later communication was extended to Savannah, Georgia. The opening of this long distance telephone line is an epoch-marking event in the history of Key West, and gives this city the only public facility enjoyed by the other communities that we have hitherto lacked. Work on the cable long distance between Key West and Havana has been begun and with its completion the longest underwater 'phone service in the world will be established.

Brigadier General Clarence P. Townsley, coast artillery corps, commander of the South Atlantic District, and Lieut. Col. Johnson Hagood were here during the latter part of January on an inspection tour.

On February 3rd, the U. S. Naval Station and Yards were closed to all except officers, employees and enlisted men. Guards are stationed at each gate to the Yards and at the Naval Station. Pending crisis, every precautionary measure is taken, owing to the fact that a large quantity of oil and supplies of all kinds are stored at the Station.

Lowell, Mass.

Mr. Thomas W. Fernald, chief clerk for this company during the past two years, left us February 12 to take up new duties in the auditing department of the Boston office. Mr. Fernald was the recipient of several gifts from the employees, and the presentation of same was made by our assistant treasurer, Mr. Hart.

Mr. Sumner T. Pike of Savannah arrived about February 1 to assume the duties of chief clerk of this company.

The Twenty-Seventh Annual Boys' Conference of the Y. M. C. A.'s of Massachusetts and Rhode Island was in session in Lowell from February 23 to 25 inclusive. The number of boys registered was approximately 700.

Paducah, Ky.

Mr. R. N. Kirkland, formerly bookkeeper in the accounting department, has just returned from Boston, where he has been employed for several months in the general office. Mr. Kirkland has been promoted to the position of chief clerk of the Paducah companies, in place of Lorenzo Emery.

Mr. Lorenzo Emery, formerly chief clerk of the Paducah companies, has been transferred to Galveston, Texas, as chief clerk of the Galveston Electric Company.

Pensacola, Fla.

Mr. W. A. Hunter, who has been with this company for the past eight months in the railway department, has been transferred to New England.

February 19th and 20 were observed as Mardi Gras days in Pensacola.

Two submarine flotillas with their parent ships are in the harbor for winter maneuvers. They are composed of vessels of the K and L classes and the tender ships are the monitors, "Tallahassee" and "Ozark." The flagship of the entire fleet is the cruiser "Columbia."

Savannah, Ga.

Mr. Sumner T. Pike, general clerk of this company for two years past, left us on January 28 to take over the duties of chief clerk of the Lowell Electric Light Corporation. The many friends of Mr. Pike in the company presented him with a handsome traveling bag on the day of his departure.

Mr. Thomas L. Small has been transferred from the treasurer's office in Boston to the accounting department of this company.

Mr. Sydney T. Lee who has been clerk in the billing department of this organization for some months has recently been transferred to the accounting department of the Houston Electric Company, Houston, Texas.

There have been several enjoyable parties at the Thunderbolt Casino under the direction of various members of this organization.

Savannah had an opportunity to become familiar with the details of a modern battleship during the visit of the "Maine" in the early part of February. Large crowds of interested guests were received on board each day up to Monday, February 5, when the "Maine" left for Tampa, Florida.

Savannah felt her worst chill in eighteen years when the mercury dropped to eight above zero on February 2 and 3. The cold wave continued for several days and water pipes were broken all over the city, it being estimated that at one time local plumbers had some 2,000 unattended-to repair orders. The city water service was badly crippled for a short while, the pumping station being forced to turn into the mains approximately one and a half times the normal flow of water in order to maintain even a nominal pressure in the residential district.

Seattle, Wash.

The event of the month of January was the meeting on the night of the 26th of the Stone & Webster Club of Washington, at Seattle, the gathering of officials and department heads of the several companies in the Puget Sound district being marked by the attendance of Mr. Edwin S. Webster of the firm of Stone & Webster, who with Mr. F. S. Pratt, vice president of the Stone & Webster Management Association and chairman of the board of the Puget Sound Traction, Light & Power Company, Mr. D. P. Robinson, president, and George O. Muhlfeld, manager of the Stone & Webster Engineering Corporation, was making a tour of the Northwest and inspecting Stone & Webster properties.

The date of the regular mid-winter meeting was set ahead to the night of the 26 so that the visitors might be entertained as guests of the club.

Owing to the fact that Mr. Webster and his party were leaving that night for Spokane, en route to Boston, they did not remain for the dinner and the entertainment that had been provided, but were seen at an informal reception in the lobby of the Hotel Washington, where Mr. Webster met a majority of the 160 members present, while Mr. Pratt, Mr. Robinson and Mr. Muhlfeld renewed acquaintances with former associates.

President A. W. Leonard went to Spokane with Mr. Webster's party, spending the day with them there and returning the following afternoon. The dinner and entertainment were entirely successful and another chapter was written in the history of the Club.

The record of the Northwest companies for the winter months deals largely with the social side of organization affairs. The Electric Club, an entirely local organization, held a well-attended meeting in the Contract Department of the Electric Building on the night of January 30, when the salesmen appeared before a packed house in a minstrel show, followed by refreshments electrically prepared in the appliance Department by the young women of the Sales, Contract and Appliance Divisions. Viewing the show from an amateur standpoint, and not being hypercritical as to professional ethics, there was a lot of fun, the black-face comedians being merciless in the matter of personalities concerning officials and well known persons in the company organization.

An Indian prophetess known as "Pilchuck Julia," who prognosticated another heavy fall of snow for this winter, given as "two squaw" deep (about eight feet), fell down on her forecast and is consequently discredited, and people hereabouts have gone back to the ground hog as a source of real authority. However, the thought of a repetition of the winter of 1915-16 stirred everybody to preparedness, and the combined efforts of the transportation department, the shops and rolling stock and department of ways and structures, resulted in the side tracking of seven snow plows and a number of track sweepers, all ready to remove the "beautiful" at any time it might come. There was a little snow and some scare, but not enough of either to make a fuss over. The sweepers were sent out and behaved well. They they went back to the barn. It is said that Pilchuck Julia's alibi is that she did not say where the snow was to be "two squaw" deep and that she meant in the mountains.

C. R. Collins, assistant engineer, has resigned his position to go to Aberdeen, Washington, where he becomes general superintendent of the Gray's Harbor Railway & Light Company. Mr. Collins took over the duties of his new position February 1. His associates in the engineering department made him a present of a handsome traveling bag.

The new Frederick & Nelson Building, one of the big contracts of the latter months of 1916, has been enclosed and is being covered with ornate cream colored terra cotta. The building is five stories above the street level and two stories below. For this work the meters have recently been ordered. The block-big building will be served from the D. C. Bus. One 800 ampere 240 volt 2-wire meter will be required on the power circuit and two 1500 ampere, 100 volt, 2-wire meters on the light. Two 2-wire meters instead of one 3-wire meter are being used on the light, to give a better bus arrangement on the back of the switchboard, thus aiding in testing each meter without interrupting service.

Tacoma, Wash.

Mr. Edwin S. Webster, of Stone & Webster, accompanied by Messrs. F. S. Pratt, D. P. Robinson (also of the firm of Stone & Webster), G. O. Muhlfeld, A. W. Leonard, and W. H. McGrath, came to Tacoma on January 24 and spent the day with Manager L. H. Bean.

The assistant treasurers of the Puget Sound properties had a meeting in Mr. Dexter's office, Seattle, for the purpose of discussing certain matters that had been taken up in the assistant treasurers' meeting in Boston recently. Mr. W. E. Wilmot, assistant treasurer of the Tacoma Companies, attended the meeting in Seattle.

A smoker for the benefit of the trainmen was held recently.

February 16 was the date of the annual dance for employees and their families.

The Stone & Webster Club had its mid-winter meeting at the Hotel Washington, Seattle, on the night of January 26, about thirty members from Tacoma going over.

Woonsocket, R. I.

Mr. Gardner Rogers, our new manager, arrived in Woonsocket on February 1, to take active charge of our company. Mr. Rogers was accompanied by Mrs. Rogers and children.

J. F. McLaughlin, who for the past four years has acted as secretary to the manager, left Woonsocket on January 31, for Beaumont, Tex., where he is to act in a similar capacity for A. F. Townsend, manager of the Beaumont Electric Light and Power Company. As a token of the esteem and respect in which he was held by his fellow employees, Mr. McLaughlin took away with him a handsome black walrus bag.

To fill the vacancy of president of the Employees Club, occasioned by Mr. McLaughlin's departure, Mr. P. J. Shunney, vice-president, was elected president for the balance of the year. N. E. Smith and Frank E. Carr were made vice-president and treasurer, respectively, and Clarence Roberts was elected secretary.

The Nyanza mills have increased their power demand on our system from 600 kilowatts to approximately 2,500 kilowatts in the last two months. This additional demand has come about through the completion of the new and large addition to their mill. In their new building, the Nyanza mills will soon add a lunch room to serve a part of their employees during the noon hour. Facilities will be provided for furnishing from three hundred to five hundred meals per day, and the kitchen will be equipped electrically throughout with ranges, steam tables, hot plates and coffee urns.

On February 22 the Employees Club held its annual pool banquet at the Monument House. The "Wilson" team, captained by Del Ferron, ate at the expense of the "Hughes" team, captained by C. T. W. Crosbie. There were forty-four who sat down at the banquet table, the winning team on one side of the table and the losing team on the other, each man being opposite his opponent in the tournament. An excellent dinner was provided, and on the menu pool terms and expressions were conspicuous. Mr. H. J. Pettengill, Jr., acted as toastmaster and excellent speeches were made by nearly every one in attendance.

Mr. F. Edwards, who was recently connected with our operating department, has been transferred to Houghton, Michigan.

The bowling tournament has just been completed, and the "Transformers" have come out on top. This team was composed of H. Bastien, captain, Clarence Roberts, Harry Pratt, E. Leduc and G. Fish, and finished by one point ahead of the "Magnets," captained by D. Champagne and composed of C. B. Healy, P. J. Shunney, P. F. Hodgkins, W. Masterson and L. Delude. To the winners goes a silver loving cup, presented by Mr. S. B. Tuell, who was our acting manager prior to Mr. Rogers' coming to Woonsocket. On April 26 a banquet will be given, at which the winning team will be the guests of honor, and on which occasion the "C. E. Z." team, finishing last in the league, will act as "funkies." This team is composed of Anson Wheelock, captain, William Curtis, N. E. Smith, R. W. Perkins and R. Hayden.

COUPONS AND DIVIDENDS DUE

	Per Cent.
Mar. 1, *Blackstone Valley Gas and Electric Company, Common Stock	2
Mar. 1, *Central Mississippi Valley Electric Properties, Preferred Shares	1½
Mar. 1, *Connecticut Power Company, The, Preferred Stock, 6 per cent.	1½
Mar. 1, Edison Electric Illuminating Company of Brockton (Coupon Notes) 5s, 1921	2½
Mar. 1, Hamilton Light and Power Company, The, 6s, 1922	3
Mar. 1, Jacksonville Traction Company 5s, 1931	2½
Mar. 1, *Jacksonville Traction Company (Coupon Notes) 6s, 1917	3
Mar. 1, Northern Texas Electric Company Preferred Stock, 6 per cent.	3
Mar. 1, *Northern Texas Electric Company Common Stock	1
Mar. 1, Pacific Coast Power Company 5s, 1940	2½
Mar. 1, People's Light, Power and Railway Company, Inc. 6s, 1917	3
Mar. 1, Seattle Electric Company, The, Seattle-Everett 5s, 1939	2½
Mar. 15, *El Paso Electric Company Common Stock	2½
Mar. 15, Galveston-Houston Electric Company Pre- ferred Stock, 6 per cent.	3
Apr. 1, Baton Rouge Electric Company (Coupon Notes) 6s, 1918	3
Apr. 1, Beaumont Traction Company 5s, 1943	2½
Apr. 1, Blue Hill Street Railway Company, The, 5s, 1923	2½
Apr. 1, Columbus Electric Company 5s, 1933	2½
Apr. 1, Columbus Power Company, The, 5s, 1936	2½
Apr. 1, Columbus Railroad Company 5s, 1937	2½
Apr. 1, Connecticut Power Company, The, 5s, 1963	2½
Apr. 1, Dallas Electric Corporation 5s, 1922	2½
Apr. 1, Electric Light and Power Company of Abington and Rockland, The, 5s, 1919	2½

*Payable quarterly.

	Per Cent.
Apr. 1, Everett Railway and Electric Company 5s, 1921	2½
Apr. 1, Everett Railway, Light and Water Company 5s, 1925	2½
Apr. 1, Galveston-Houston Electric Railway Company 5s, 1954	2½
Apr. 1, Haverhill Gas Light Company, Capital Stock, (\$50 par)	\$1.12½
Apr. 1, Houghton County Traction Company Preferred Stock, 6 per cent.	3
Apr. 1, Nevada Power, Light and Water Company 6s, 1932	3
Apr. 1, New London Gas and Electric Company, The, 5s, 1927	2½
Apr. 1, New London Gas and Electric Company, The, 5s, 1929	2½
Apr. 1, Savannah Power Company, (Coupon Notes) 6s, 1917	3
Apr. 1, Savannah, Thunderbolt and Isle of Hope Rail- way, The, 4s, 1947	1
Apr. 1, Sierra Pacific Electric Company (Coupon Notes) 5s, 1919	2½
Apr. 1, Tacoma Railway and Power Company 5s, 1929	2¼
Apr. 1, Woonsocket Electric Machine and Power Com- pany 4½s, 1943	2¼
Apr. 15, *Puget Sound Traction, Light & Power Com- pany Preferred Stock	\$75

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

FEBRUARY 28, 1917

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	100	No	Pref	8%	168
Baton Rouge Elec. Co.	{ Bond, 1939 Notes, April, 1918	5% 93½ 6% 100	6%	91		.....
Blackstone Valley Gas & Elec. Co.	5%	102½	*6%	107	8%	160
Blue Hill St. Ry. Co., The	5%	91	No	Pref		.....
Brockton & Plymouth St. Ry. Co.	4½%	91				
Cape Breton Elec. Co., Ltd.	5%	93	6%	85	3%	51
Central Mississippi Valley Electric Properties	No	Bonds	*6%	72½		12 N
Columbus Elec. Co.	{ Bonds, 1933 Notes, July, 1917	5% 90 6% 100½	6%	85		35
Columbus Power Co., The	5%	94		.....		.....
Connecticut Power Co., The	5%	98	*6%	96		100
Dallas Elec. Co.	{ Notes, Jan., 1921 Notes, June, 1917	6% 101 5% 100				
Dallas Electric Corp.	Bonds, 1922	5% 99		.....		.....
Eastern Texas Elec. Co.	{ Bonds, 1942 Notes, Dec., 1918	5% 95 6% 101	*6%	90	5%	65
Edison Elec. Mfg. Co. of Brockton	{ Bonds, 1930 Notes, March, 1921	5% 100 5% 100	No	Pref	8%	175
El Paso Elec. Co.	5%	99	6%	100	10%	X 112
Fall River Gas Works Co.	No	Bonds	No	Pref	12%	250
Galveston Elec. Co.	5%	95		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	81 ^B / _L	.....	38 ^B / _L
Galveston-Houston Elec. Ry. Co.	5%	95	No	Pref		.....
Haverhill Gas Light Co. (Stock par value \$30)	No	Bonds	No	Pref	9%	98
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	97	6%	23	5%	17
Houghton County Traction Co.	5%	93	*6%	85		50
Houghton County St. Ry. Co., The	5%	100	No	Pref	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	100 ^B / _L		.....		.....
Jacksonville Elec. Co.	5%	98½	No	Pref	No	Com
Jacksonville Traction Co.	{ Bonds, 1931 Notes, March, 1917	5% 88 6% 100	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	95		.....
Key West Elec. Co., The	5%	72½		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	225
Mississippi River Power Co.	5%	78 ^A / _B		40 ^A / _B		11 ^A / _B
Northern Texas Elec. Co.	5%	95	6%	85 ^B / _L	4%	65 ^B / _L
Northern Texas Traction Co.	5%	101½	No	Pref		.....
Pacific Coast Power Co.	5%	98	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	75 ^L		15 ^L		5 ^L
Pensacola Elec. Co.	{ Bonds 1931 Notes, Jan., 1919	5% 90 6% 99½	*6%	78		11
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	86		40
Puget Sound Elec. Ry.	5%	80 ^B		.....		.....
Puget Sound Power Co.	5%	97½	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	{ Bonds, 1919	6% 100	*6%	75		30
Railway & Light Sec. Co.	{ First Series, 1935 Second Series, 1939 Third Series, 1939 Fourth Series, 1942 Fifth Series, 1944 Sixth Series, 1946	5% 100 5% 100 5% 100 5% 100 5% 100 5% 100	*6%	98	6%	95
Savannah Elec. Co.	5%	70 ^B / _L		20		5
Seattle Elec. Co., The	{ 1st Mortgage, 1930 Cons. & Ref., 1929 Seattle-Everett, 1939 The Seattle Ry., 1921	5% 102 ^B / _L 5% 97½ ^L 5% 92 5% 101½	No	Pref	No	Com
Sierra Pacific Elec. Co.	{ Notes, April, 1919	6% 99½	*6%	75		6
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	101	No	Pref	10%	126
Whatcom County Ry. & Lt. Co.	5%	93	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified.

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange
L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights

LIBRARY NOTES

Missing: "Auditing, Theory and Practice," by R. H. Montgomery.

"*The Book of Knowledge*," known also as "The Children's Encyclopedia," is now on exhibit in the Library, in twenty volumes, buckram binding. This publication has received so much recognition that it might justly be called a classic, and is well worthy of inspection by all who are interested in encyclopedias popularized into illustrated books of reading.

"*America and the New Epoch*," by Charles P. Steinmetz, is said to be one of the very best books we ever added to our library, and should be widely read. The author is too well known to need much comment, but he makes the following interesting statement about himself in the introduction: "For several years I was employed by a small manufacturer; then for nearly a quarter of a century with a huge manufacturing corporation, and helped make it what it is today. Thus I have seen the working of small individualistic production—where every cent increase of wages appears so much out of the pockets of the owner—and of corporate production, and have realized, from my acquaintance with the inside workings of numerous large corporations, that the industrial corporation is not the greedy monster of popular misconception, bent only on exploitation, and have most decidedly come to the conclusion that, even as crude and undeveloped as the industrial corporation of today still is in its social activities, if I were an unknown and unimportant employee I would far rather take my chances with the impersonal, huge industrial corporation than with the most well-meaning individual employer."

We have the several reports in connection with the Hearing on the *Water Power Bill* before the Committee on Public Lands, United States Senate, 63d Congress, 3rd Session, the act itself being "to provide for the development of water power and the use of public lands in relation thereto, and for other purposes." They are dated 1914 and 1915.

We have recently catalogued the following *six military books*: Washburn's Elements of Military Hygiene, 1909; Field Service Regulations United States Army, 1910; Infantry Drill Regulations United States Army, 1904; Provisional Regulations for Saber Exercise United States Army, revised 1908; Small Arms Firing Regulations, 1906; "Camp Co-operation," Book of Proceedings, Association Island, 1913.

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil Engineering

- 123 **Materials of construction.** J. B. Johnson. 4th ed. New York, 1915. 795p, 6x9 $\frac{1}{2}$. *077.J63m.1915
- 124 **U. S. Government specification for Portland cement.** Bureau of Standards, Circular 33. 3d ed. 1917. 43p, 7x10. *6898.C33
- 125 **Standard specifications and tests for Portland cement of American Society for Testing Materials . . .** [Reprinted by Portland Cement Association, 12/16]. 20p, 6x9. *0772.Am311p
- 126 **The disintegration of concrete in railway tunnels.** C. A. Newhall. (In Proceedings Pacific Northwest Society of Engineers, Oct.-Nov., 1916.) Seattle [c1917]. 17p, 6x9. *0772.N451
- 127 **Steel railway bridges, designs and weights.** E. C. Dilworth. New York, 1916. 184p, 12 $\frac{1}{2}$ x9 $\frac{1}{2}$. *0734.D589
- 128 **Hydro-electric power (2 volumes).** Lamar Lyndon. Vol. 1: Hydraulic development and equipment. Vol. 2: Electrical equipment and transmission. New York, 1916. 499p, 360p, 6x9, illus. *0732.L989. Vols. 1&2
- 129 **Handbook on natural resources of Oklahoma.** C. W. Shannon . . . Oklahoma Geological Survey. Norman, 9/16. 96p, 4 $\frac{1}{2}$ x6, illus, map. *4901.09
- 130 **Report of State Water Problems Conference, California, 11/25/16.** Sacramento, 1916. 125p, 6x9. *6400.W381.05
- 131 **Rules, regulations, forms and practice of office of State Engineer and State Water Board regarding control, distribution and use of the water resources of Oregon . . .** Bulletin No. 6. Salem, 1916. 70p, 6x9. *6200.En33.Bull 6
- 132 **Organization, plan and scope of Natural Resources Survey of Canada.** A. D. Little, Ltd. Montreal, 1916. 8p, 6x9. *7200.N219. 0291
- 133 **Water powers of Manitoba, Saskatchewan and Alberta.** L. G. Denis . . . Additional data respecting water powers of Southern Manitoba and Bow River. J. B. Challies. Commission of Conservation, Canada . . . Toronto, 1916. 334p, 7x10, illus, maps. *7200.C76. 073msa
- 134 **Collection of articles on water and power in industry.** [In Scribner's Magazine, May, 1912.] *0732.B791

(20) Electrical Engineering

- 135 **Underground transmission and distribution . . .** E. B. Meyer. New York, 1916. 312p, 6x9, illus. *07125.M575
- 136 **Principles of alternating current machinery.** R. R. Lawrence. New York, 1916. 614p, 5 $\frac{1}{2}$ x8 $\frac{1}{2}$, illus. *071.L378
- 137 **Data for central station engineers . . .** Metropolitan Engineering Co. New York [c1917]. 48p, 6x9. *07.M567
- 138 **Experimental researches on the skin effect in steel rails.** A. E. Kennelly, F. H. Achard and A. S. Dana . . . (Reprinted from Journal of Franklin Institute, Aug., 1916). (55p), 6x9, illus. *07126.K391
- 139 **The tractive resistance on curves of a 28-ton electric car . . .** University of Illinois . . . Bulletin No. 92, Sept., 1916. Urbana. 54p, 6x9. *0712.I16c
- 140 **Electric railway, electric lighting, gas and water power properties, 1917.** Stone & Webster. 85p, 5x7 $\frac{1}{2}$, maps. *600.E12.1917
- 141 **Association of Edison Illuminating Companies: minutes of 32d annual meeting (37th convention) . . .** 1916. 416p, 6x9, illus. *6920.1916.v. 32

142 Proceedings New England Section, N. E. L. A., 1916. 489p, 6x9. *6922.1916

143 Chemistry and preparedness. L. H. Baekeland. From World's Work, Sept., 1916. (14p), 6½x9½. *074.B144

(30) Mechanical, (40) Gas Engineering

144 Report to Commission on gas, oil and electric power . . . Chicago City Council . . . regarding Commonwealth Edison Co. Chicago, 1913. 113p, 6x9. *C2731.21.0511

145 A study of oil engines in Iowa power plants. Iowa State College of Agriculture and Mechanical Arts. Ames, 1916. 159p, 6x9. *0792.1o9

146 The gas works book. United Gas Improvement Co. Philadelphia [c1917]. 131p, 9½x12½, illus. *078.Un33

147 The gas industry: Census Bureau's summary concerning the industry for 1914 . . . 1 sheet, 8x19. *6891.02mg.1914

(57) Military

148 Why the armor plant should be located at Paducah, Ky. Paducah Board of Trade. 11p, 6x9, illus. *3111.02

149 European economic alliances: a compilation of information on international commercial policies after the European war . . . Compiled under direction of . . . National Foreign Trade Council . . . New York, 10/16. 2d ed. 127p. 6x9. *027.N2134eu

150 The purposes and ideals of the Mexican revolution. Addresses . . . Supplement to The Annals American Academy of Political and Social Science, Jan., 1917. 31p, 6½x10. *017.Am35

151 Four books on Military regulations: field service, infantry drill, saber exercise and small arms firing. Issued by U. S. War Department. *6830.0294

152 The elements of military hygiene . . . P. M. Ashburn. Boston [c1909]. 314p, 5x7½. *017.As32

153 Camp co-operation: book of proceedings . . . Association Island Corporation . . . [c1914]. 218p, 6x9, illus. *017.As3529

(73) Sociology, (74) Finance

154 The present labor situation, compulsory investigation and arbitration. The Annals of American Academy Political and Social Science for Jan., 1917, devoted to the subject. 305p, 6½x10. *029.Am35p

155 Report of a special inquiry regarding aged and dependent persons in Mass., 1915 . . . Mass. Bureau of Statistics. Boston, 1916. 107p, 6x9. *1402.05ad

156 Transactions of Efficiency Society, Inc. Vol. I, 1912. New York, 1913. 444p, 6½x9½. *6998.1912

157 Vocations for the trained woman . . . Women's Educational and Industrial Union. 296p, 6x9. *029.W842

158 Addresses and papers on insurance. R. M. Potts. Springfield, Ill., 1917. 489p, 6x9. *055.P859

159 Investment Banker's Association of America Bulletin, vol. 4, 1915. 160p, 7x9½. I B A A B, vol. 4.1915

(76) Legal

160 Handbook, labor laws of Mass. Mass. Bureau of Statistics. Boston, 1915. 346p, 6x9. *1402.0517h

161 Laws relating to licensing of electricians . . . Mass. State Examiners of Electricians, year ending 11/18/16. Boston, 1917. 246p, 4x8. *1400.05141.1916

162 Report of decision of Railroad Commission of California regarding City of Los Angeles vs Southern California Edison Co. Decision No. 3625. Sept. 6, 1916. 198p, 6x9. *6404.0551a

163 Income tax service, 1915. The Corporation Trust Co. vp, 7x10. *0818.C817in

- 164 The Bay State rate case: Report and order, Aug. 31, 1916. Mass. Public Service Commission. 116p, 6x9. *1404.0355bs
 165 Revenue for increased army and navy appropriations. Hearings and briefs . . . 64th Congress, 2d Session, on H. R. 20573 . . . Wash., 1917. 203p, 6x9. *6800.025r

(80) Statistics

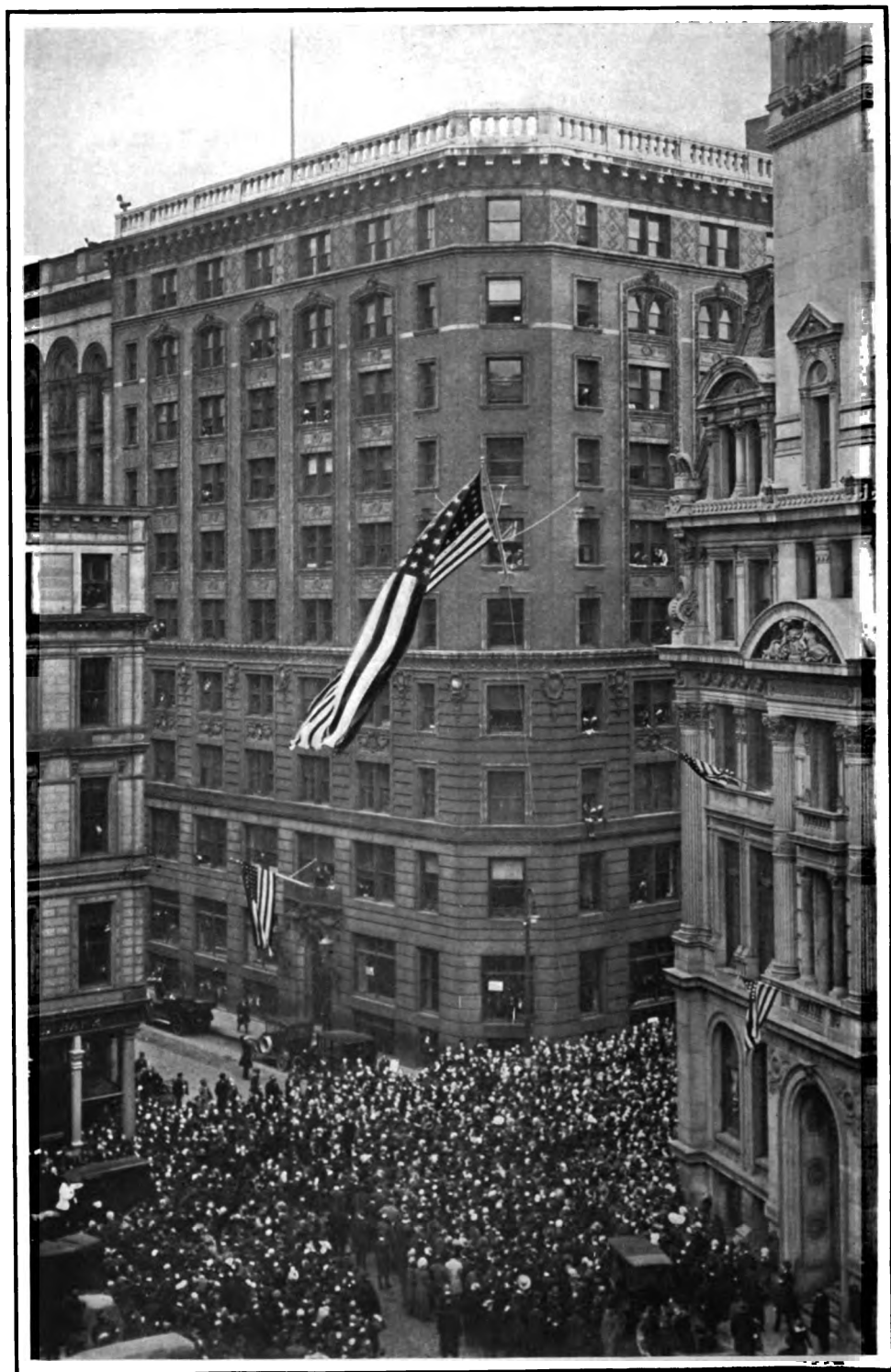
- 166 Summary of railway returns for fiscal year ending June 30, 1916 . . . Bureau of Railway Economics. Wash., 1917. 24p, 6x9. *022.B89su.1916
 167 Pawtucket, past and present . . . Printed for Slater Trust Co. 1917. 55p, 6x9, illus. *1511.02
 168 Census of manufactures: general totals for U. S. by geographic divisions, states and industries, 1914, 1909, 1904 and 1899 . . . Wash., 1916. 26p, 6x9. *6891.02m.1914
 169 Forest fires in the U. S. in 1915. U. S. Department of Agriculture . . . Wash., 1917. 6p, 6x9. *6880.C69
 170 Facts relating to operations of Tacoma Railway and Power Co., 1916. 18p, 6x9. *6131.0223

(90) Sources of Information

- 171 Boston register and business directory, 1917. Sampson & Murdock Co. Boston [c1917]. 1007p, 6x9½. *1461.093b.1917
 172 Some events of Boston and its neighbors. Printed for the State Street Trust Co. Boston, 1917. 62p, 6x9, illus. *1461.St29.065
 173 Harvard University Catalogue of names, 1916-17. Cambridge, 1916. 456p, 5x7½. *1445.H26cp 1916-17
 174 The agricultural index, first annual cumulation, 1916 . . . The H. W. Wilson Co. 1917. 256p, 7x10½. *096.Ag83.1916
 175 Readers' Guide to periodical literature supplement . . . 1916 . . . The H. W. Wilson Co. 1917. 222p, 7x10½. *096.R223s.1916
 176 Hildreth's annual index of Mass. law, 1915-16 . . . Edwin A. Howes, Jr. Boston, 1916. 314p, 6½x10. *1400.Su76.096 (221-224)
 177 Second industrial directory. Pennsylvania Department of Labor and Industry. Harrisburg, 1916. 1795p, 6x9½. *1802.093
 178 New York Times Index. Vol. 4, No. 4, 1916. New York [c1916]. 424p, 6x9. *096.N489.Vol. 4, No. 4
 179 Municipal Year Book, City of New York, 1916. 235p, 6x9. *1791.09. 1916
 180 Foreign relations of the U. S. . . . Price list 65. U. S. Superintendent of Documents. Wash., 1916. 40p, 6x9. *6806.Pl65.11/16
 181 List of references on embargoes. Library of Congress. Wash., 1917. 44p, 7x10. *6808.096em
 182 Climatological data, New England Section. Annual, 1916. Boston. (10p), 9½x12. *6881.N449.1916an
 183 Charter, by-laws and list of members. Canadian Society of Civil Engineers. Montreal, 1916. 216p, 6x9. *7200.C499.093
 184 The Journal of the American Institute of Architects, Jan., 1917. Subscription placed for 1917
 185 Geographic tables and formulas. Compiled by S. S. Gannett. U. S. Geological Survey . . . Bulletin No. 650. Wash., 1916. 4th ed. 388p, 6x9. *6874.B650

Miscellaneous

- 186 Net maximum rate and minimum charge, residence service in cities of U. S. of over 50,000 population (1910 census). 2 sheets, 8½x11. *023.N17r Same for retail power service. 2 sheets, 8½x11. *023.N17
 187 The Friar-land inquiry, Philippine Government. Reports by W. C. Forbes, D. C. Worcester and F. W. Carpenter. Manila, 1910. 207p, 6x9. *6620.F74f
 188 Public libraries and business men. A. R. Hasse. (3p), 9x12. *085. H277p



A PUBLIC UTILITY FLAG-RAISING
(See Boston Office Notes)

STONE & WEBSTER JOURNAL

APRIL, 1917

EDITORIAL COMMENT

Attention is here called to the letter which the firm has sent to the members of the Stone & Webster organization regarding their attitude toward the war, and which is reproduced on page 295 of this issue. It is there pointed out that it is the duty of each man to study his own personal case calmly and carefully, and neither to permit himself to be carried away by too enthusiastic a desire for active service, nor to neglect his duty to enlist if he is unable to serve to greater advantage in some other way. The operation of public utilities must be carried on in time of war as well as in time of peace, and executives and technically trained men may conceivably render the most effective service to the country by remaining at their posts. Again, the Government will have to undertake a very considerable amount of engineering and construction work which must be performed with more than ordinary rapidity in order to provide adequately and quickly for the equipment of even a moderate sized army and navy, and this organization has offered itself as a whole to the Government for the prosecution of such work. It may be said in this connection that \$3,000,000,000 of the \$7,000,000,000 of the new war debt of the United States is to be loaned to the Allied Governments. This money will be spent in this country for commodities and services necessary to the proper conduct of the European war, and it follows that its expenditure here will make the services of engineers and technically educated men in strong demand.

* * *

In view of the heavy increase in taxation which will be necessary in this country in order to finance the war and its consequences, it will be well to consider the advisability of allowing increased returns on capital. The returns of labor have increased very fast in the last few years, and in justification

has been pleaded the rapidly increasing cost of living. Yet capital has felt the increased cost of living also. It is a mistake to suppose, as many people do, that the term "capital" necessarily connotes people of great wealth. As a matter of fact, a countless number of persons in this country are possessed of capital in only moderate amounts, and the annual return to a large percentage of these is probably small enough to escape the income tax. As a class, capitalists have felt the pinch of the high cost of living acutely. Yet even if we should assume that all capitalists were persons of great wealth, there would be a very valid reason for allowing them a fairly large return. By doing so the nation would equalize taxation and secure a larger revenue.

* * *

This should be obvious. Today a very large part of the people of the United States pay no income tax; under the Federal system they are exempt up to \$3,000. In such times as these it is not too much to ask that incomes below \$3,000 be made to pay part of the cost of government. There is, of course, a point at which incomes can legitimately be exempted from taxation. A person in receipt of less than \$3,000, and even of half that amount, should, however, feel obligated to pay something into the general fund, even though it may require a sacrifice. If he does not pay it in the form of direct tax, he should pay it in higher prices for the commodities and services which he consumes; for if by so doing he increases the dividends of those who produce these commodities and services, he will, under a graduated form of income taxation, throw some of the burden upon them. It will be a good thing in the months that are before us to throw as many persons into the income tax paying class as possible, and to raise as many people now in that class to the classes paying the surtax. On the ground of common justice, persons deriving income from capital are fully as much entitled to a substantial return in order to meet the high cost of living as are those deriving income from labor. And on the ground of pure expediency it will be advisable to let them have it, in order that the government may be in receipt in these critical times of larger and more equitably apportioned taxation.

Hoover and the Belgian Children

It is inconceivable that anyone could read the remarks which Mr. J. W. Hallowell made recently at Milton, Mass., and

which are reproduced in this issue, on saving the Belgian children from starvation, without being stirred to the depths. Mr. Hallowell is chairman of the newly-formed Committee on Supplementary Rations of the New England Belgian Relief Fund. Some time ago Mr. Hoover, the head of the Commission for Relief in Belgium, who has within the last few days accepted the chairmanship of the new Food Commission in the United States, was horror-struck on finding that the ration which the Commission for Relief in Belgium had been providing since the beginning of the war was, though sufficient to keep the adult population in fairly good condition, inadequate to the need of growing children, who all over Belgium had begun to be seriously affected with tuberculosis, rickets and other grave complaints. He immediately took up the Herculean task of supplying a supplementary ration. If he fails a horrible future will overtake Belgium.

Mr. Hallowell's remarks are thoroughly impregnated with the infinite pathos of the situation. The facts which he recites are drawn largely from an address which Mr. George Barr Baker, one of Mr. Hoover's assistants, made before a number of Boston business men a fortnight ago. Those of us who listened to Mr. Baker will never forget the experience. We shall never hear Hoover's name mentioned, or that of the Commission for Relief in Belgium, without a stirring of the pulse and a feeling of gladness that human nature is capable of such deeds as theirs. Yet when we hear these names today we are not without a feeling of shame. Mr. Baker said the other day that there is not a spot in Belgium where the women and children do not cross themselves when the American flag goes by. They think that the relief that has kept them alive during the last thirty-three months has come from us, while the fact is that we have furnished only an insignificant portion of it, though a band of heroic Americans have collected and disbursed it.

This small company has made the name of America illustrious and it will be our shame if in the weeks and months to come we do not measure up to their standard.

England and France have made enormous sacrifices in behalf of the suffering Belgians, who at Liege fought for human liberty as perhaps no people ever fought since Thermopylae. But they cannot be expected to do much more—there is a limit to everything, even to such splendid endeavor as theirs. The Belgian children must waste away, the Belgian people

must forego its future, unless the American people come forward liberally to supplement the efforts of the English and French.

The thought is not to be tolerated that we shall be found wanting. The Belgian children *must* be saved from starvation. We do not believe it possible for Mr. Hallowell's committee to present its tale without the most generous response.

The War

We are now at war, and with the mixed emotions which such a state of affairs inevitably occasions. We are unprepared and are far from knowing what will be required of us. The energies and resources of the American people must be mobilized effectually and with the smallest loss of time, and the task is not an easy one. Still, the experience of Great Britain, whose lack of preparedness in 1914 was fairly comparable (so far as ability to fight on land is concerned) to ours today, should be profitable to us. It will be impossible for this country to equip and train a large force short of a good many months, and by that time the need of our assistance in the field may be past; that consideration should not, however, be allowed to keep the nation from making every endeavor to prepare for the worst. Whatever the outcome of the existing situation may be, it is to be hoped that we shall never again be caught so flagrantly lacking in every requisite of war, barring money, as we are in this instance.

So much, however, has been said on all sides of late regarding this aspect that we need not join in the discussion. With all our preoccupation in getting and spending money, we Americans are capable of being turned into soldiers and made a troublesome enemy. If the war does not end before we get a chance to show what we can do in the way of military prowess, we shall unquestionably acquit ourselves like men.

At any rate most persons take that for granted and are perhaps thinking more about the economics of the war than about the purely military features of it. If on top of about \$1,000,000,000 of existing national debt we issue \$7,000,000,000 of new indebtedness, we shall create a situation which will, on the face at least, exceed anything in our previous history. Suppose in the end we find ourselves with a national debt of about \$8,000,000,000 bearing $3\frac{1}{2}$ per cent interest. That would

mean about \$280,000,000 per year for interest, or about \$2.80 per capita. But \$3,000,000,000 of the new loan is to be loaned to the Allies, who will pay a sum equivalent to the $3\frac{1}{2}$ per cent interest and eventually pay the principal. Hence we shall actually pay about \$175,000,000 interest on about \$5,000,000,000 of debt. Doubtless a very considerable part, if not the whole, of this sum could, if our government were conducted with good business judgment, be saved in our annual budget without impairing any vital interest of the nation. Our extravagance in the past has been proverbial and forced economies will heighten our moral welfare as well as our material.

In 1860, on the eve of our Civil War, one of the greatest wars in history up to that time, the population of the United States was about 31,500,000, the total wealth of the nation \$16,159,616,000, and the wealth per capita \$513.93. In 1912 the population was 95,410,503, the national wealth \$187,739,071,090, and the per capita wealth \$1,965. These figures show that we can about as easily take care of an \$8,000,000,000 debt today as we did a \$2,674,815,856 debt in 1865. In that year the per capita debt was \$76.98, whereas an \$8,000,000,000 debt would, with our present population of 105,000,000, mean a per capita debt of a little more than \$77. From the point of view of interest charge the comparison is very much in our favor. The high rates of the sixties made the per capita charge on the Civil War debt \$3.96 in 1865, \$4.12 in 1866, \$3.84 in 1867; in fact, the per capita charge did not fall below \$2.80 (which is what \$8,000,000,000 at $3\frac{1}{2}$ per cent would cost annually) until 1872.

The above figures ignore the fact that \$3,000,000,000 of our \$8,000,000,000 national indebtedness will be offset, both as to interest and principal, by the credits it will make for us with the Allies. Deducting it, we find that the net debt of \$5,000,000,000 means a per capita debt of a little less than \$48, and a per capita interest charge of about \$1.70.

Of course, if the war lasts several years more, the amount which we now contemplate raising will be likely to prove inadequate. It is mere guess-work to say when the end will come, but recently a hope has sprung up that peace is not many months away. This hope is based not only on the current military operations in Europe, but even more on economic developments, and to no little extent on the increasing signs of political unrest in certain of the belligerent countries. The

economic impairment of the Allies (now our allies) will be made good in no slight measure by us, if \$3,000,000,000 of the proceeds of our new war loan is turned over to them. Such a contribution by this nation should shorten the war appreciably.

On the whole, the indebtedness incurred by us as a party to the war ought not, other things being equal, to work unbearable hardship to this country. If the money is honestly and prudently spent, if during the coming years we eliminate waste and extravagance from our civil expenditures, and if the burden of the war taxes is equitably apportioned, we can view the future with a fair degree of tranquility. Such apprehension as now exists in the minds of the American people is probably occasioned largely by a fear that these conditions will not be met, and it cannot be denied that our past wars have furnished ample ground for such fear.

In such a time as this the best and most experienced minds should be in charge of our affairs. The nation has enlisted in a war to maintain its rights under international law and to rescue the world from a terrible fate. Whatever the cost of the war, it must be paid; and we should be glad to pay it. Nevertheless, as it is bound under the most favorable circumstances to be heavy, the aim of this government should be to make every dollar do the largest work possible. This is a task that calls for minds of a very high order and great experience.

It must be the desire of every one that we emerge from the war with our resources impaired as little as possible. The national wealth has increased phenomenally since August, 1914, and by reason of the war in Europe. We have held aloof from the struggle for nearly three years and have grown rich in unprecedented fashion. Now it is our turn to enter the fray and we can afford to devote to the task the enormous wealth which we have accumulated from Europe's need. Let us devote every dollar of this gain, and as much more of our wealth as is necessary, to bringing the war to a speedy and successful conclusion; but let us all bear in mind that a penny saved is a penny earned, and be prudent without lacking generosity.

THE BELGIAN CHILDREN*

BY J. W. HALLOWELL

It is usually fatal in these times for a man to try to talk about a subject second-hand and on which he himself is not an expert. I feel very humble indeed in attempting to talk to you on such a subject as Belgium, but if I am able to pass on to you only a small part of the enthusiasm and interest which Mr. George Barr Baker, of the Commission for Relief in Belgium, has instilled into me and the other members of the recently formed Committee on Supplementary Rations of the New England Belgian Relief Fund, I feel sure that the Community Plan, or Communal Plan, for supplying an extra daily three-cent meal to hungry Belgian children will appeal to you.

When the war broke out in August, 1914, you will recall that there were thousands of Americans stranded abroad. It was a difficult, intricate and delicate job to get money and passage home for those Americans. Herbert C. Hoover was the man of the hour in London for Americans and made an international reputation then and there, so that when a few weeks later distress signals were displayed by the civil population of Belgium, Ambassador Page asked Mr. Hoover to take active charge of the Relief Commission. The request was answered instantly.

Mr. Hoover was born in Iowa, but is known as a Californian. He graduated from Leland Stanford University with the class of '94, and later took a degree from the same University in mining engineering, which has been his profession ever since.

The Commission for the Relief of Belgium is affectionately known to every man, woman and child in Belgium and Northern France as the "C. R. B.," and Mr. Hoover is known the world over as its chairman.

Hoover's organization consists of about 200 men and one woman, Charlotte Kellogg, who was in Belgium for six months, and who is the wife of the member of the Commission who has been in charge at Brussels. About 45 members of the Commis-

*An address to citizens of Milton, Mass., on April 10. Mr. Hallowell has accepted the position of chairman of the Committee on Supplementary Rations of the New England Belgian Relief Fund.

sion have been constantly in Belgium. Hoover's most active assistants in America have been Honnold, Rickard and Baker.

The task of the C. R. B. has been, and still is, stupendous. Its work, under the most extraordinarily difficult, complicated and discouraging circumstances, has been one of the fine things of the war, and a monument to Hoover and his assistants.

Belgium is about the size of Maryland; a little larger than Massachusetts. Before the war it was the most densely populated country in the world, called "the Beehive of Europe" on account of its active industries. Its population is 7,500,000, and in Northern France, occupied by the Germans, there are 2,500,000 people, making a total of 10,000,000 in the occupied territory.

Now, what happened to Belgium! Suddenly, unprepared, 7,500,000 people were locked within a ring of steel; their food was taken away from them; their factories were closed, their fields were literally wrecked by shells; 3,500,000 of them became totally destitute, and 1,250,000 of these were children. In a speech which Mr. Hoover made in New York in February, just before he returned to Rotterdam, where he now is, he described this situation as follows:

"I ask you to assume that this city and an area embracing a few counties were occupied by an enemy army. Your boundaries would be marked with a wall of steel. You would be, from military necessity, blockaded of imports. The daily flow of 70 per cent of your food supplies to your cities from beyond the wall of steel would cease, and your markets and bakeries would be empty. Every citizen and every village would hoard food to themselves. You would be interdicted from movement outside of your own ward or village, or from assembly in any manner without permission. Your railways would be taken over for military purposes. All communication would cease with the outside world. Your post, the telegraph, and the telephone would be suppressed. Your factories would be closed and half your people rendered destitute over night, through their loss of wage and income. Your normal newspapers and periodical press would be suppressed. The theatres would be abandoned; your whole intellectual activity smothered. The normal seats of administration would be occupied by enemy soldiers. A sentry would stand on every street corner, and every cross-road, and the instinctive feeling of security of every free man in his right to be heard in justice would be submerged in the practical

power over life and death by the enemy army. You would be called upon to contribute to the cost of the occupying army. In a word, the whole economic, intellectual and governmental functions of ordinary life would be suspended.

"In a picture of such a situation you can, however, never imagine the indescribable despair and terror of every citizen, the terror fanned by the millions of rumors which shiver through the population. Couple with this the over-shadowing fear as to failure of the very food upon which your women and children survive or die. Consider to yourselves the double weight of anxiety that every understanding man in the community must feel, not only for this, the vitals of bare existence, but for the tranquility of the community lest in the riots that must mark the exhaustion of the meagre stock of food your streets should run with blood. This is war.

"Such has been the situation of 10,000,000 people in Belgium and Northern France for over two years, but for the Relief Commission. And this has been a Relief not only to their physical being, but to their terror and a shield to their despair."

Hoover and his Commission opened the door for these people as far as it could be opened. Later in the same speech Hoover said:

"We asked the world for charity on behalf of their countless destitute. We had two problems—food for those who could pay, and, second, to support the destitute. We had thought initially that so terrible a situation could exist only for days, that we must find a few millions; but within a month we realized that we were confronted with a task not merely over days but months, and an expenditure far beyond the dreams of any relief hitherto known. It became clear that the rills of charity of the world would fail us. Ultimately we secured the support of the Allied Governments. And now, after 800 weary days, we look back on an expenditure of some \$250,000,000, of which \$30,000,000 have been from charity, of which America has found under \$9,000,000."

The latest figures are that \$270,000,000 have been spent in cash and supplies—\$30,000,000 of which have come from benevolence. America's \$10,000,000 is part of this, and the balance of \$240,000,000 has been supplied by the British Government and French institutions.

Mr. Hoover has often mentioned the embarrassment and feeling of shame of the members of the Commission because the

Belgian people think that America is responsible for practically all of the relief work. This is due, of course, to the fact that the Commission does the entire distribution of food and supplies.

Do read, if you have not already done so, Charlotte Kellogg's article in the April *Atlantic Monthly*, called "A Cinema of the C. R. B." It describes wonderfully the unbreakable spirit of the Belgian people, particularly the women; it describes also the method of feeding the 1,250,000 destitute children; the ingenuity used in varying the menus with almost nothing to do it with.

Mr. Baker, of the C. R. B., came to Boston recently to give our Committee on Supplementary Rations a proper background for its campaign. He is a wonderfully inspiring man. He has been in Belgium and Northern France so much during the entire war, the picture of suffering and indomitable courage is so vivid in his mind, that his descriptions are most realistic. His devotion to this cause is complete.

I want to read a number of extracts from his talk which were taken down by a stenographer:

"We have one of the largest shipping organizations in the world. Our ships have made 524 voyages in two and a half years and during these voyages we have lost seventeen ships, including the one which we believe we have just lost. We hope that the ship which is reported as lost today struck a mine and that it was not torpedoed, but, even if it were torpedoed, it is still insured, we will get the money and will start more food because it *cannot* be stopped. Three of the sunken ships were torpedoed; fourteen struck mines, as far as we can tell.

"The French in their pride have asked us never to beg for their people. They give us \$6,000,000 a month, with which we buy their food and distribute it among them. In addition to that the French give us \$3,500,000 a month for Belgium, and the English give us the same amount.

"The Belgian refugees in England, 220,000 of them, are all at work in British industries except 15,000, and these 15,000 are women, old men and children. They give us \$300,000 a month out of their earnings and this is an enormous amount, considering their situation. They all have families.

"A year ago shoes had disappeared. Wooden shoes were being made but even they were getting scarce and Belgium is very cold in winter. We got a frantic cable from Hoover to get some clothes and we begged America to get \$3,000,000 worth

so that we could put something on the backs of most of the utterly destitute in Belgium and Northern France. The well-off had already cut up their sheets and table cloths to make clothes for the poor. We did very well; we got about \$900,000 worth of clothes. When we get desperate we put our faith in God and buy what is necessary, so we put \$525,000 into shoes and the Rockefeller Foundation came forward with \$200,000 and the English did the rest. The shoes were made in New England mostly.

"Then something happened which I think almost killed Hoover. A 50 per cent ration, which is what 3,500,000 Belgians have been getting for two and one-half years, is all right for an adult who has not much to do and, therefore, we might think it would be enough for a child; but suddenly right across the country there came a wail. There were rickets and tuberculosis everywhere and all the nervous ills of childhood, and it was so sudden and so universal that it looked like the beginning of disaster; and our brag had been that there would be no starvation in Belgium. We had seen the children in Poland die.

"Hoover cabled to America and Dr. Lucas of the University of California answered. He arrived in Belgium very active, energetic and keen and thought he could call a convention of physicians. Now physicians cannot travel in Belgium any more than any one else, so he went from place to place and got statistics from all the physicians. Then he went to Brussels to consult the physicians there; but there was no necessity of investigating what was the matter: it was only too obvious. We call it under-nutrition because the Belgians do not want it understood that they are starving. It is a fact that children cannot live on what will keep grown people alive; they do not keep clear minded, nor develop bone, blood or muscle.

"The children are kept in school. Nothing is more important than sustaining the morale of these people; and, oh, how they have sustained it themselves! Schools have been kept open because the homes are no place for children to be in. There is no fuel, no comfort, and there is the eternal, morbid fear—fear of the mother for her child's health, that has lasted now going on to three years. And the silence—they do not hear from their husbands, fathers or brothers. A German prisoner in England can hear from his home, but a Belgian woman is not supposed to hear from her man.

"They started right in, those physicians, to see what could

be done; but when they announced that it was a clear case of starvation, Hoover went several million dollars into debt without any hesitation. He ordered wheat, sugar and fats. It has been very difficult to get fat into Belgium because there has always been the fear in the Allied countries that the Germans might be tempted too far. But the people cannot live without some oils and fats, and we have been able to take in a little lard and bacon.

"After many experiments, a phosphatine biscuit was devised—a mixture of rice, wheat, maize flour and phosphate of lime. That biscuit, with a cup of cocoa, had an immediate effect on the children who were not already below the normal line. So the Commission immediately took over factories and began making that biscuit. The monotony of the ration for those destitute people is deadly—a pint of soup with a hunk of bread every day, with the addition two or three times a week of a little lard or a few beans in a bag!"

In order to encourage the poor Belgian mothers to keep their children clean and in the best possible physical condition, the Commission and its faithful assistants instituted "Prize Days" throughout the various communes—days when the mothers of the "best kept" children receive prizes which, to them, are worth many times their weight in gold. Those prizes are small balls of lard!

Mr. Baker continued: "Many children who had this phosphatine biscuit delivered in the schools or other centres under careful supervision, began to regain their weight. There are now about 200,000 actually on the sick list; 'enfants debiles,' they are called. These sick children are the objects of solicitude and unselfish devotion by the Belgian women—those wonderful, wonderful Belgian women whom I hope Mrs. Kellogg will tell you about some day. She is a woman of the world, a woman who has watched the world, and she believes there has never been anything like the Belgian women. She can tell you of the princess of the royal line, the shop girl, and the telephone girl, all working together from early in the morning until late at night making the canteens decent, cooking the food and serving it.

"The Commission feels that it has done its work well as far as it has gone, but it has not known how to get at you. We have not known how to spread ourselves over the United States and make you realize that this is not our job alone; to

make you realize that the American flag has been carried higher and farther than any flag has ever been carried before. There is not a spot in Belgium where the women and children do not cross themselves when that flag goes by, and when they thought it was going to be taken away from them, Cardinal Mercier ordered prayers in every church that the Americans be allowed to stay.

"We have known always that we should have to go some time, and all of the time we have been preparing for it. We have been training the Belgians and we knew that the Dutch Government would give us men of the highest character and ability to carry on the work under our supervision from Rotterdam and London."

Before taking up in detail the Community Plan, let us consider the two principal questions which are undoubtedly in your minds.

First: Will Germany prevent the distribution of food in Belgium under present circumstances?

In answering this question, I will give you the exact words of Mr. Baker:

"Germany will not interfere with the distribution of food in Belgium for the following reasons:

"(1) Germany is committed by two years of practice on the part of the officials of the Government to the distribution of food in Belgium and Northern France under the present organization. The Germans consider that the efficiency of that organization has reduced the work to a minimum. They also realize that they could not, even if they had the food, inaugurate any such safe mechanical operation of distribution as is now conducted by the Committees working with, and under the direction of, the American engineers.

"(2) If Germany should refuse to permit future imports into Belgium, and if the Belgians' rations per capita should be reduced to one-quarter of normal instead of the present one-half of normal, the psychological effect in such crowded sections would be mobs and riots as soon as the minds of the leaders began to give way. The effect upon Germany would be that she would be required to keep at least two more army corps scattered through the villages merely to quell this maddened populace.

"(3) Germany realizes that even among her own soldiers

there is a certain human sympathy with the suffering around them, and she is not likely to assume the responsibility of convicting herself in the eyes of her common people (the Army) of that form of inhumanity.

"(4) They have repeatedly expressed their admiration for the performance of the Commission for Relief in Belgium and have said they could not interfere with anything as efficient. There seems to be in all of them a strong admiration for the mere mechanics of efficiency, even while they cannot understand the spirit back of them."

The second, and perhaps the most important, question is:

Can the food reach Rotterdam indefinitely in view of the intensified U-Boat campaign?

That question cannot be answered definitely by any one. Apparently the "safe conduct" promised by Germany to Belgian Relief Ships is being disregarded to a certain extent. This is the exact situation: The C. R. B. has 46 ships under charter, 25 of which are Belgian and the balance principally Norwegian. There are 5 more Belgian ships which may be chartered at any time.

A total of 19 ships has been lost, 8 of which have been sunk since the beginning of the intensified U-Boat campaign.

Of the total number of ships sunk, all but 6 have run into mines. Every ship carried full insurance on the cargoes and the Commission has invariably obtained the money. Five of the ships sunk were empty.

Only 4 per cent of the cargo tonnage carried in the total of 543 voyages (round trips) has been sunk.

But, regardless of these sporadic sinkings, the work of supplying food to Belgium *must* go on. The intention of the C. R. B. is to increase its efforts as the obstacles become more serious.

If a steamer ran on a bar and the passengers and crew could not be taken off in the raging storm, and the food gave out, and those people began to starve; and if a line were finally gotten to that steamer over which food could be hauled, but, due to the breakers much of the food were lost or ruined in transit—would you stop sending out food, would you cease in your efforts to overcome every obstacle in the way of getting sustenance to those sufferers? Assuredly no! You would continue to send food regardless of the amount lost—you would strain every resource to save those lives.

Isn't our question answered? Are we to relax in our efforts to salvage the hungry Belgians because a small number of ships carrying food to them are torpedoed or run into mines? It should not be necessary to ask that question twice of a human American.

Now let us consider the Communal Plan.

When it was proved beyond the question of a doubt that at the end of two years the children were rapidly deteriorating, with tuberculosis and rickets increasing with heart-rending rapidity, it was apparent to Mr. Hoover that something must be done to supply the children with more nourishment. He could not call upon England and France to borrow more money and add to their tremendous burdens, so he turned to his own country—the richest in the world—with a plan that it furnish \$1,250,000 a month—\$1.00 a month for each dependent child in Belgium.

There are 10 Provinces in Belgium divided into 126 Regions and in these Regions are approximately 2,600 communes or towns. Maps have been made of the 126 Regions and all the children—3,000,000 in all—of whom 1,250,000 are destitute—have been indexed and card catalogued. This has been a stupendous performance and was only possible on account of the characteristics of the Belgians, who have always been a highly organized people.

To communities throughout the United States is now offered the privilege of supplying the children in these Belgian communes with one supplementary meal each day during the war at a cost of \$1.00 a month for each child, or \$12 a year.

So it has been put up to America to "come through" on this proposition. It has been put up to Massachusetts to take care of the 20,000 children in the Region of Louvain—at 3 cents a meal, which—I repeat—means \$1.00 a month, or \$12.00 a year, the total, approximating \$240,000, to be raised in this state.

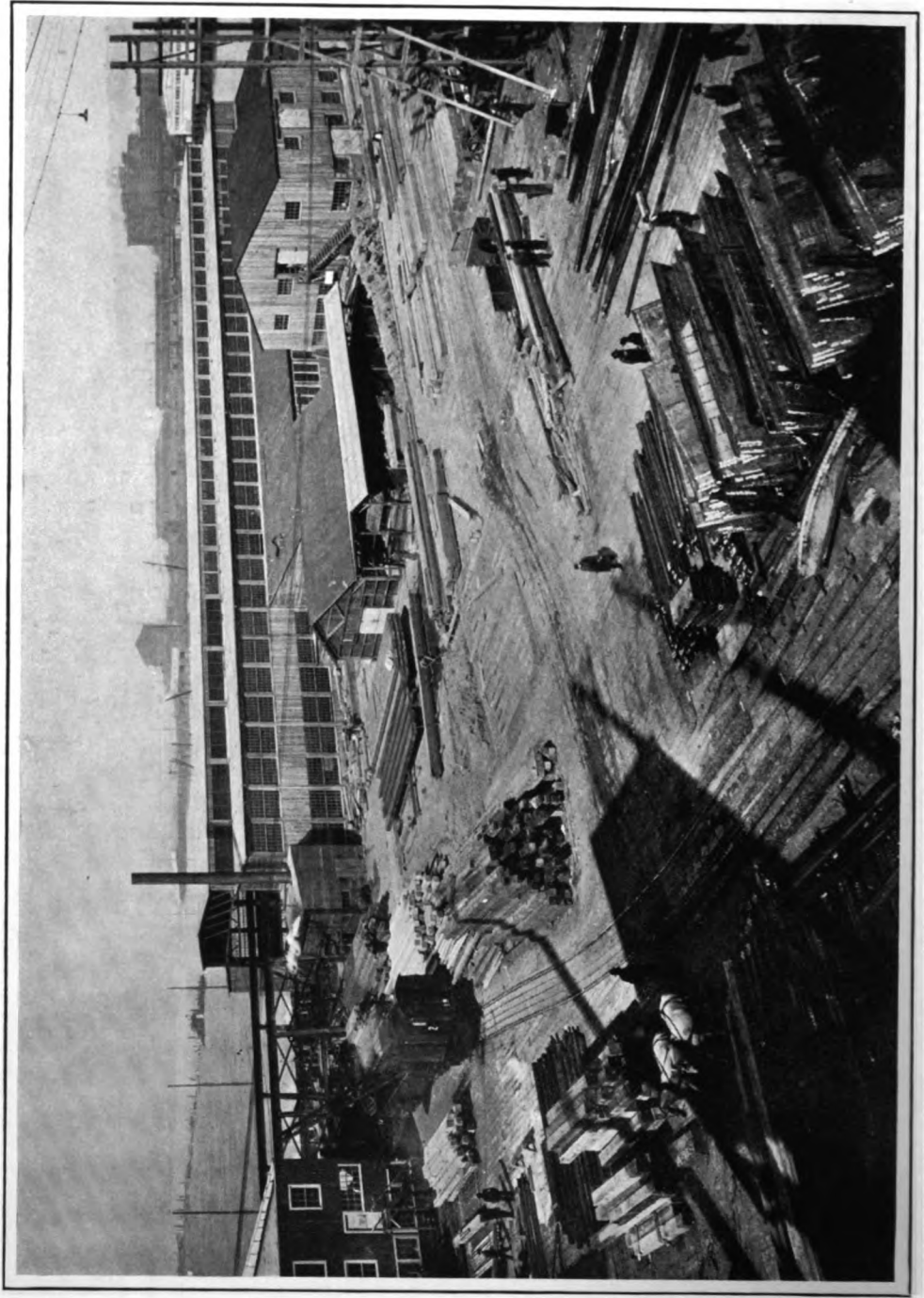
This Communal Plan is already well started:—over 150,000 children have been placed. A good start has been made in Massachusetts, and I have marked on the map of the Region of Louvain the communes which have already either been actually underwritten or are reserved by towns throughout the state.

If this meeting considers with favor the proposition that Milton should take a Belgian commune, perhaps the first

question will be as to the number of children; that is, the size of the commune. Remember that on a yearly basis of \$12 per child, each 100 children means \$1,200. Therefore, 500 children would mean \$6,000; and 1,000 children would mean \$12,000.

I wish that I could have transmitted to you today the picture that Mr. Baker gave to us in his simple, eloquent way, with a sincerity that rung true blue from beginning to end. To us it seems little enough that this great country should be asked to supply that daily meal to those children. They are not only hungry over there—they are actually on the verge of starvation. That seems almost inconceivable to us here in a town full of happy and healthy children; there are over 1,600 children in the Milton Public Schools alone.

Isn't it worth while to help those people? It is in our power to alleviate the terrible anxiety of the Belgian mothers; it is in our power to buy for \$1.00 a month, or \$12 a year, the health of those Belgian children. But to do so, we must act now and generously; each one of us must take as many of those children as we feel that we can; to put it off even into the very near future might be too late.



PRINCIPAL MACHINE SHOP OF THE NEW PLANT OF THE AMES SHIPBUILDING & DRYDOCK CO. THIS PICTURE WAS TAKEN
FEBRUARY 13. THE SITE WAS VACANT SAND LOT UP TO DECEMBER 6, 1910

SEATTLE'S NEW ERA OF SHIP CONSTRUCTION

BY KENNETH C. KERR*

The startling rapidity with which the city of Seattle has forged to the front rank among American ports as a great ship-building and maritime center is attracting the attention of the country. For years this growth in all that pertains to maritime commerce had been evidenced, although the increases from year to year in various branches of the great industry had not been marked. When the reports for 1915 had been prepared, even the most enthusiastic supporter of the Puget Sound metropolis was of the opinion that the high tide had come and gone. The following year, however, produced far greater totals and the first quarter of the present year indicates that the end is not in sight and that the port of Seattle has embarked upon an era of ship construction the magnitude of which could not have been imagined a few years ago.

The history of shipbuilding on Puget Sound dates from the very earliest settlement of the various cities located on that attractive body of water. Going back to a period antedating such settlement, legend gives the information that the vast supply of timber extending to the very water's edge of this great inland sea had for countless years been utilized by the Indians, whose fantastically carved and decorated, but none the less true and staunch, war canoes and smaller craft for primitive commercial pursuits, were recognized as among the best produced on the broad Pacific.

Modern history records that as early as 1853 a schooner was built on the Sound, and from that date through several succeeding decades wooden vessels of various style or rig went down the ways from shipyards on the Sound, and it was these wooden vessels that greatly helped to take care of the rush to the Fraser river gold fields and subsequently to Alaska, while they were utilized in transporting the lumber, coal, wheat and other commodities of the Puget Sound country to various ports of the world. Flat-bottomed steamboats, built in Seattle yards knocked-down and shipped to Alaska, while others made the perilous trip under their own steam, were among the pioneer craft that helped develop traffic on the mighty Yukon, and some of the records made by locally built sailing ships in the

*Editor Railway and Marine News, Seattle.

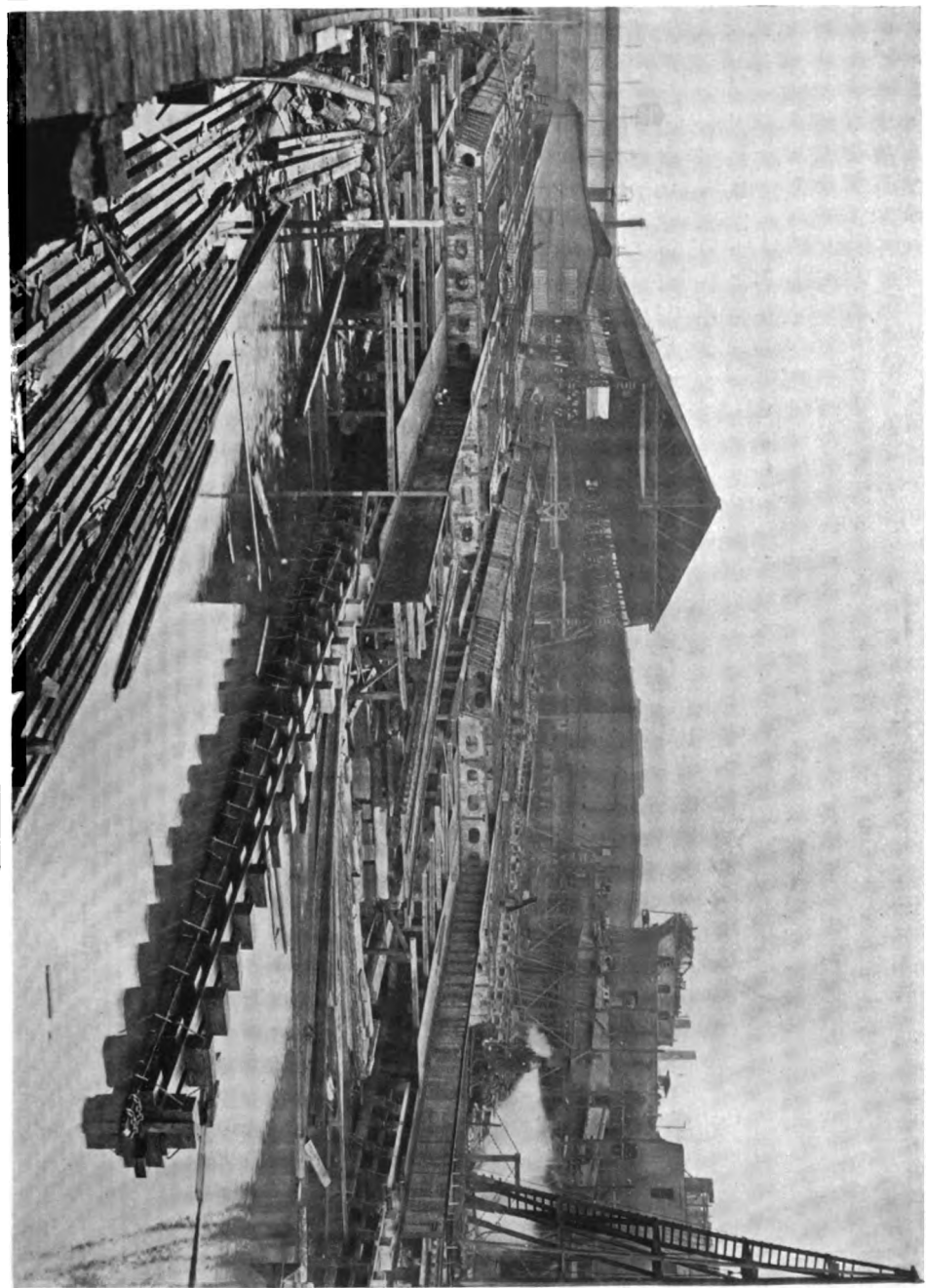
off-shore trade are still pointed to with pride by those who follow with interest the story of ships and shipping.

Prior to the opening of the great European conflict but one large company was regularly engaged in the construction of steel ships at Seattle. This was the Seattle Construction and Dry Dock Company, successor to Moran Bros. Co. For years it had been engaged in building merchant and naval vessels, including the battleship "Nebraska," submarines, submarine tenders, large steel freighters of the type of the "Seward," "Latouche" and others, with many local passenger and freight vessels.

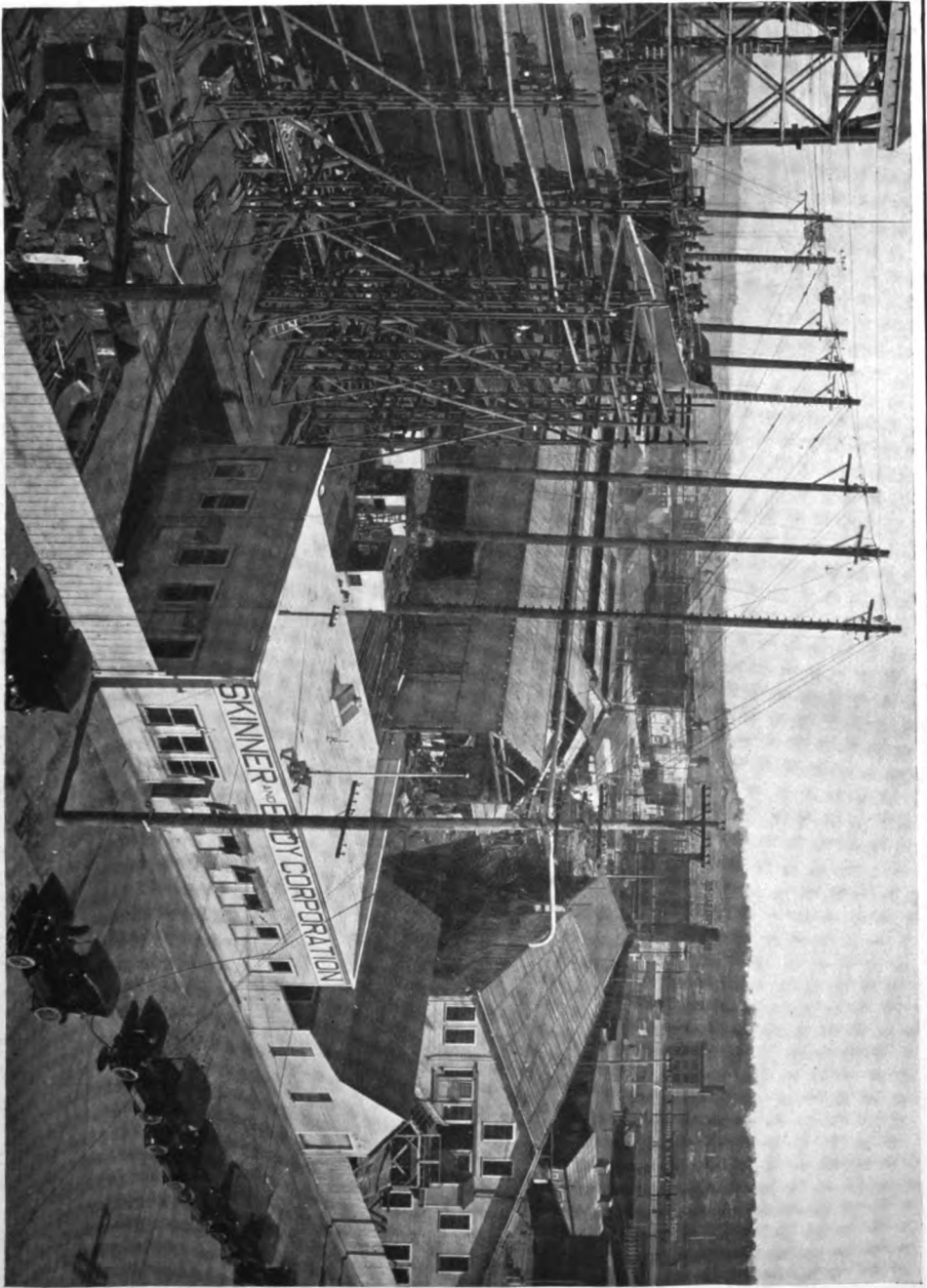
After war was declared in 1914 and the demand for ships became pronounced, the first news of the birth of a new industrial era at Seattle was the announcement that this pioneer shipyard had received from New York the contract for two freighters for the New York & Cuba Mail Steamship Co., known as the Ward Line. This was the first time a company operating on the Atlantic had come to the Pacific Coast to build its ships. Later this was followed by an announcement that the company had secured contracts for building several freighters for foreign account and two additional steamships for other companies operating on the Atlantic. This, with various naval contracts in hand, meant that by the opening of the year 1916 the Seattle Construction & Dry Dock Co. had all the work it could handle for some months to follow.

Later it was announced that the company had been sold to the Todd Shipyards Corporation of New York, of which W. H. Todd is president, and from then on came additional news from time to time of many more ships contracted for. This company was one of the few to make a bid for a United States scout cruiser last fall, which was accepted by the Navy Department, and other naval contracts have followed. Following the desire of the Navy Department to refrain from detailing the department's plans, the number of ships and other news features will be omitted from this brief article, which will refer exclusively to merchant ships.

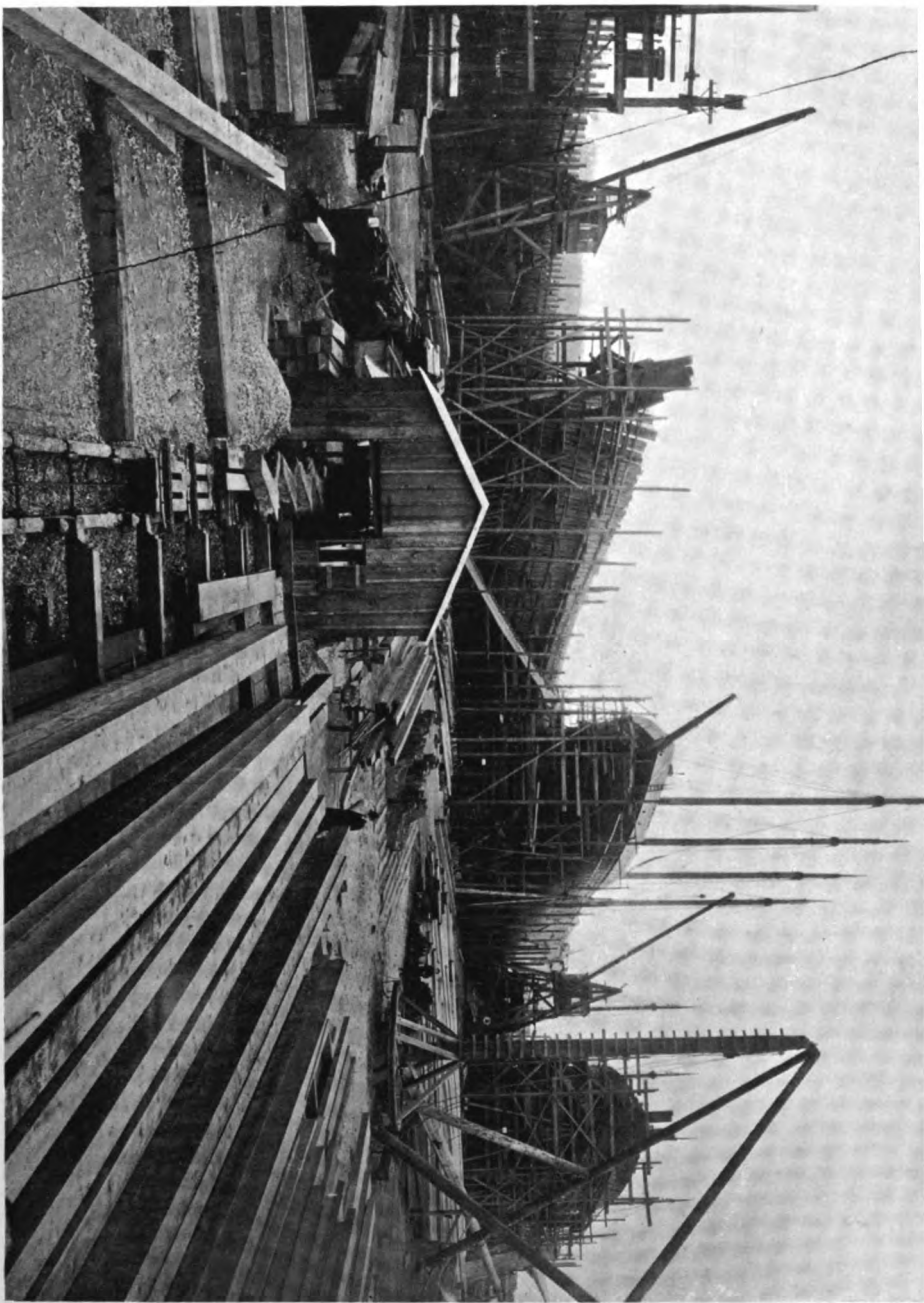
Meanwhile the demand for tonnage became more acute and the firm of Skinner & Eddy was organized for the purpose of building steel merchantmen. This company was organized late in 1915, the site for the plant was cleared February 1, 1916, and the first vessel successfully launched on September 21, 1916. This vessel was the "Niels Nielsen" of 8,800 tons, built for B. Stolt Nielsen of Haugesund, Norway, and it was followed



WATERFRONT VIEW SEATTLE CONSTRUCTION & DRY DOCK CO., SHOWING KEELS OF THREE MERCHANTMEN AND ONE NEARLY COMPLETED FREIGHTER



COMPLETING A VESSEL AT SKINNER & EDDY CORPORATION PLANT—THIS PLANT WAS A BARREN SAND LOT IN FEBRUARY, 1916



FOUR WOODEN AUXILIARY SCHOONERS AT THE YARD OF THE WASHINGTON SHIPPING CORPORATION

by the "Hanna Nielsen" and the "Luise Nielsen." Each of the three vessels loaded at Seattle with full cargoes for the Orient, and one of them, having made a round voyage, started on her second outward voyage from Seattle. For the Standard Oil Co. the mammoth tanker "S. V. Harkness" was launched and many vessels will go down the ways from this yard during the present year.

The Seattle Construction & Dry Dock Co. launched the "Cauto" and the "Panuco" in the autumn of 1916, and these vessels were loaded at Seattle for the Atlantic Coast via the Panama Canal. This company will have many launchings during the present year.

The firm of J. F. Duthie & Co. had for years been engaged in small boat construction at Seattle. Early in 1916 this company was reorganized with C. D. Bowles, president, J. F. Duthie, vice-president and general manager, and W. R. Bowles, secretary, and with ample capital leased an additional site on Harbor Island and announced its intention of erecting a modern plant and going in for large boat construction. Out of twelve acres of sandy desert on the east side of the island, in the short space of three months was built a modern and fully equipped shipyard and the keels of two 8,800 ton steel freighters were laid. This company has the contract for twelve such steamships, many of which will be launched during the current year.

The Ames Shipbuilding & Drydock Co. was organized in December, 1916, and great plans were at once begun for the construction of a mammoth plant on the West Waterway, Seattle Harbor. One of the accompanying illustrations shows a portion of the plant of the Ames Co. taken on February 15. Sixty days previously, December 15, this was a barren sand lot. On March 15 the keels of two mammoth steamships for foreign owners had been laid. This company was organized by Edgar Ames, president, George W. Albin, secretary and treasurer, and David Hollywood, general manager.

Owing to the scarcity of steel and the delay experienced in getting delivery for new orders, wooden shipbuilding has likewise witnessed a great revival. Built during the year on Puget Sound were two wooden steamships each 235 feet in length and five wooden schooners, which are to be equipped with auxiliary oil engines.

The Washington Shipping Corporation of Seattle established a large yard on the West Waterway and at the date of writing has launched two of these wooden auxiliary vessels and

has four additional vessels in course of construction. One of the illustrations shows four of these vessels side by side on the stocks. Each vessel bears the name of a city of the Northwest, and it is expected that they will be largely utilized in moving lumber and other Northwest products to various foreign ports.

The great impetus given to ship construction brought about an equally encouraging revival in the allied trades, and among the more prominent firms at the present moment enjoying a share in this new prosperity are the Commercial Boiler Works, Vulcan Manufacturing Co., Heffernan Engine Works, Seattle Machine Works, Enterprise Brass Foundry, Olympic Foundry Co., and Standard Boiler Works.

It is estimated that shipyards and allied industries employ 10,000 men, with an estimated payroll of \$30,000 per day.

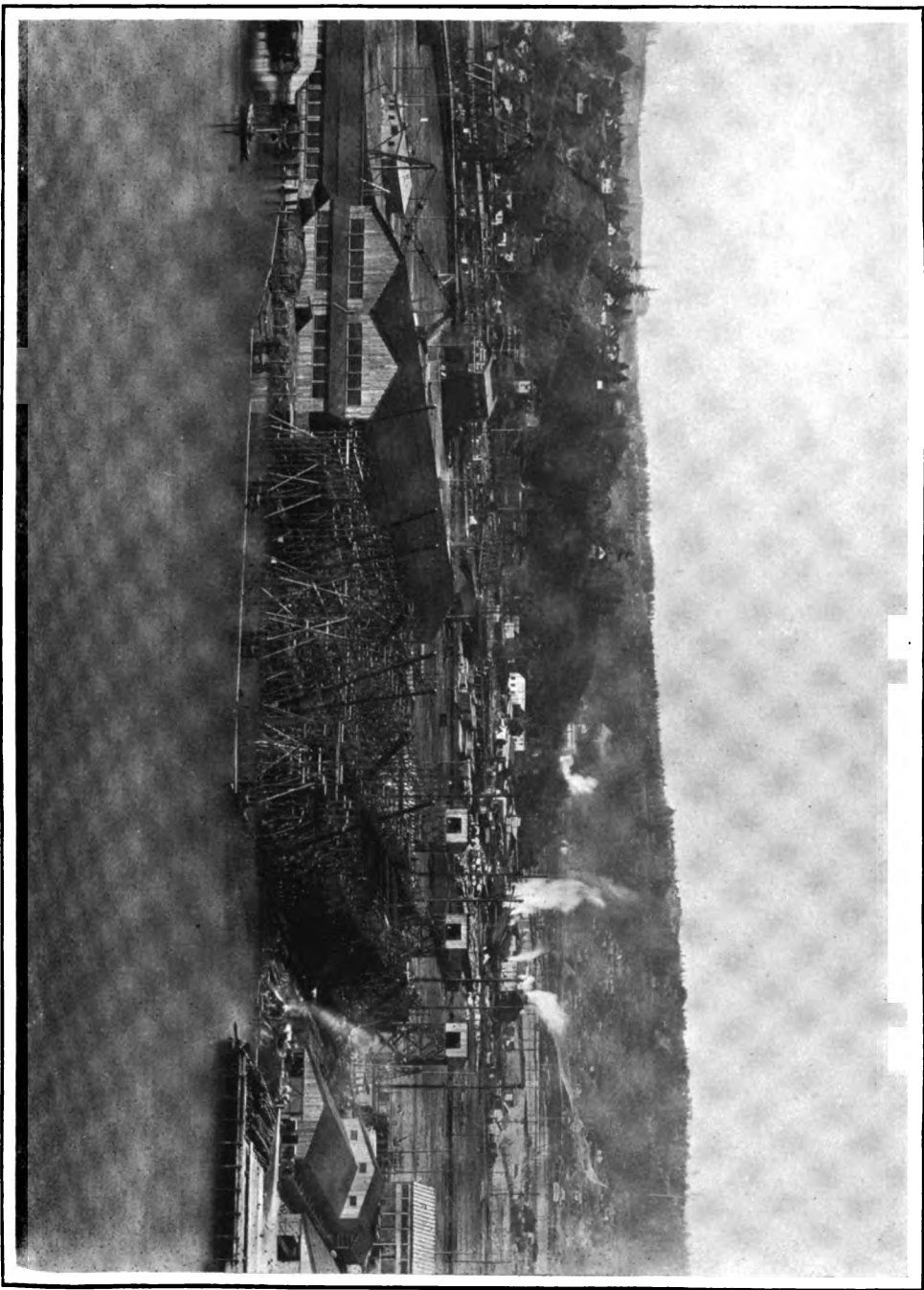
It is also worthy of note that in addition to the causes leading up to the general activity in large boat construction, the Alaska trade with Seattle, the fishing, and local industries have shown great increases during the last two years, and this has brought about a heavy demand for smaller craft. Among those busily engaged in wooden construction of all classes, including life boats, and who are now keeping their plants going at full time, are Nilsen & Kelez, John Wilson's Ship & Boat Yard, Tregoning Boat Co., Winslow Marine Railway & Shipbuilding Co., National Shipbuilding Co., James W. Hall, Marine Pipe & Machine Works.

At the present moment Seattle shipyards have contracts for fifty-five large steel steamships, with an estimated tonnage of 484,000 and an estimated valuation of \$95,000,000. In addition are being constructed numberless United States naval vessels, large wooden schooners, fishing boats, launches and life boats, the latter being built locally as part of the equipment for the large steamships.

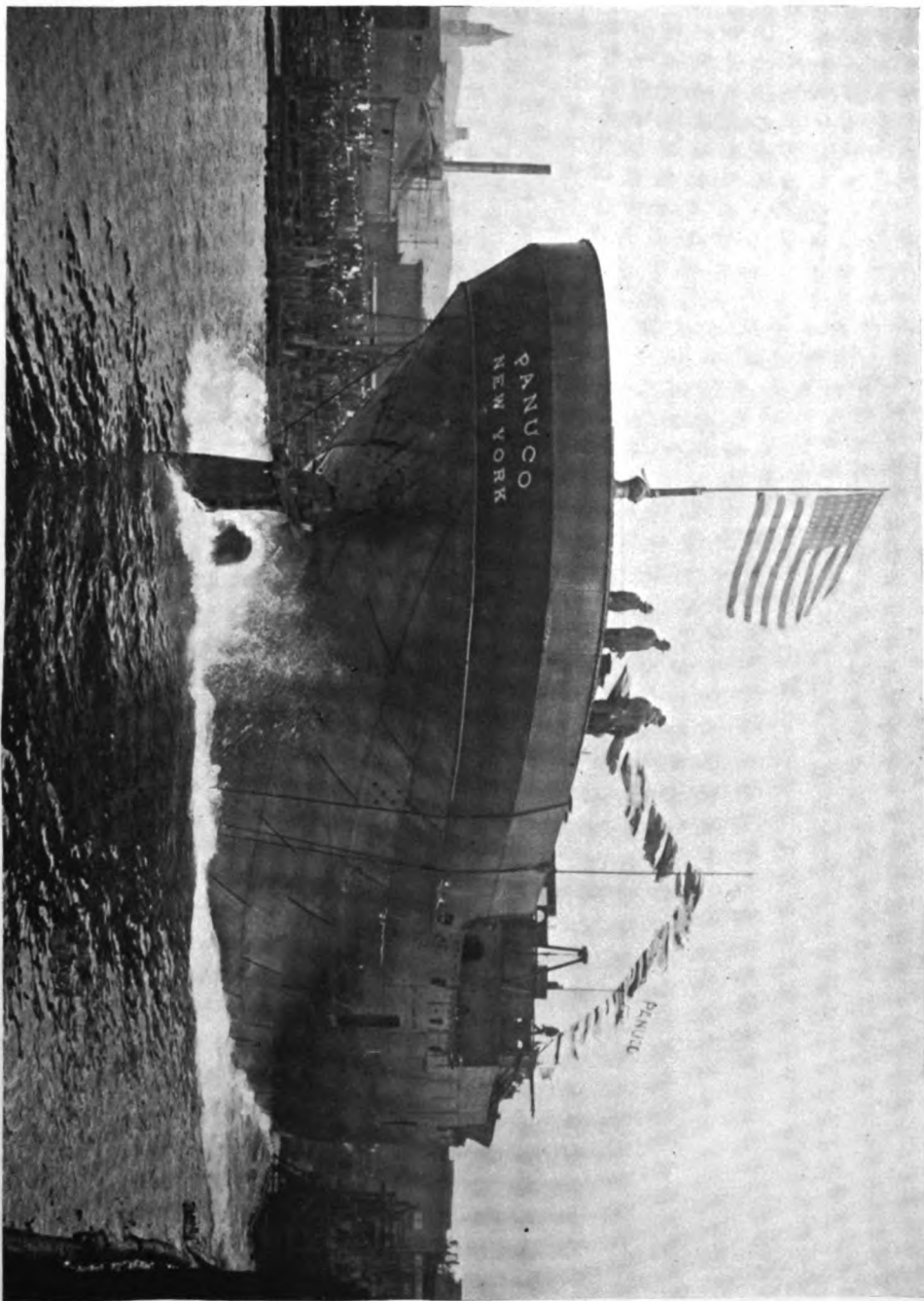
The Todd interests recently formed the Todd Shipbuilding & Dry Dock Corporation and will establish a plant on the Tacoma tideflats, where six large merchantmen will be commenced this year, this new organization being allied with the Seattle Construction & Dry Dock Co., C. W. Wiley, president of the later, having in charge the work of establishing the Tacoma yard.

The Washington Shipbuilding Co. has been organized by C. A. McMasters and has secured a fine site on the flats opposite the Tacoma Hotel.

The Seaborn Shipyards, also located at Tacoma, has launched two auxiliary schooners and is constructing others,



NEW PLANT OF J. F. DUTHE CO., SHOWING THREE STEEL FREIGHTERS IN PROCESS OF CONSTRUCTION



LAUNCHING OF THE "PANUCCO" FOR THE WARD LINE AT THE PLANT OF THE SEATTLE CONSTRUCTION & DRY DOCK CO

while another company organized for wooden ship construction at Tacoma is the Pacific Coast Shipbuilding Co.

The shipbuilding activity is also spreading to other ports of Puget Sound, so that the next few years will be memorable ones in the history of the industry in this section of the country.

Closely allied with shipbuilding is the development of Seattle's commerce and it may be interesting to briefly review the annual report for the year 1916, compiled by the port warden. This report covers every feature of waterborne commerce at the port, including government vessels, freight and passenger boats of all classes ranging from the smallest fishing craft to the largest Vladivostok freighter. A total of 52,685 vessels arrived and departed. These vessels had a total net tonnage of 20,017,682. They brought into port or took from Seattle docks 4,376,928 tons of cargo of an estimated value of \$412,438,319. The last total shows an increase of \$154,645,926 over the calendar year 1915. The total number of passengers of all classes in and out numbered 2,985,031.

For the year 1916 the port of Seattle advanced to first place among all the ports of the world in the value of salt water products received over the docks, this valuation for the year exceeding \$18,000,000.

Taking the foreign trade alone, the customs district of Washington, of which Seattle is the headquarters, exceeded all the other customs districts on the Pacific Coast taken collectively, the official figures taken from the United States Summary of Foreign Commerce, being as follows:

FOREIGN TRADE

	Twelve Months Ending December	
	1916	1916
Pacific Coast	Imports	Exports
Alaska (Juneau)	\$ 1,579,070	\$ 1,809,708
Hawaii (Honolulu)	6,588,481	444,661
Oregon (Portland)	2,434,679	4,019,260
San Francisco (San Francisco)	117,128,253	126,758,024
Southern California (Los Angeles)	5,462,810	4,439,848
Washington (Seattle)	161,779,832	198,747,108
Total	\$294,973,125	\$336,218,609

Of this total it will be seen that the district of Washington handled 57 per cent of the total foreign trade of the Pacific Coast of the United States.

WOODEN SHIPBUILDING ON PUGET SOUND

BY FRANK DABNEY

Shipbuilding is very active on Puget Sound, as it is at other points on the Pacific Coast, and the building of both steel and wooden vessels has, in a little over a year's time, developed into an industry employing many thousand men, and new plants are continually springing into existence and operation.

As is well known, there is a tremendous demand for any vessel that can carry freight, and this demand has brought out of retirement every craft that can be made seaworthy, and even vessels that have lain for many years at the bottom of the ocean or buried in the sand are being floated, repaired and put in commission.

Perhaps the most interesting feature of the move in shipbuilding, is the revival of the building of wooden ships. There are shipyards in operation building wooden ships in Seattle, Tacoma, Olympia, Grays Harbor and Bellingham on Puget Sound, and a shipyard is contemplated for Everett. In addition there are yards building wooden ships at Portland and Astoria on the Columbia River.

The usual type of wooden vessel being built is the four or five masted bald-headed (no topmasts) schooners with auxiliary oil engines of the Diesel or semi-Diesel type. At Olympia a new yard now being equipped will built motor ships, using no sails, and this type seems to be coming into favor.

These wooden vessels run from 2000 to 3600 tons dead weight capacity, and while many of them are intended primarily for lumber carriers, they will be suitable for general cargo that does not require quick delivery. These vessels will have the speed of tramp steamers, nine to eleven knots per hour, and will carry from one and one-half to two million feet of lumber off-shore, and ten to fifteen per cent more coastwise, on account of carrying large deck loads. This Northwestern country, with its immense timber resources, fine bays and land-locked waters, is destined to become the great wooden shipbuilding center of the United States. The ability to get out sticks and timbers of almost any dimensions is utilized for such solid construction as will prevent either lateral or longitudinal "hogging," with little or no steel reinforcement. The keel sticks are 100 to 110 feet in length, 18 or 20 inches square of clear lumber. The floor

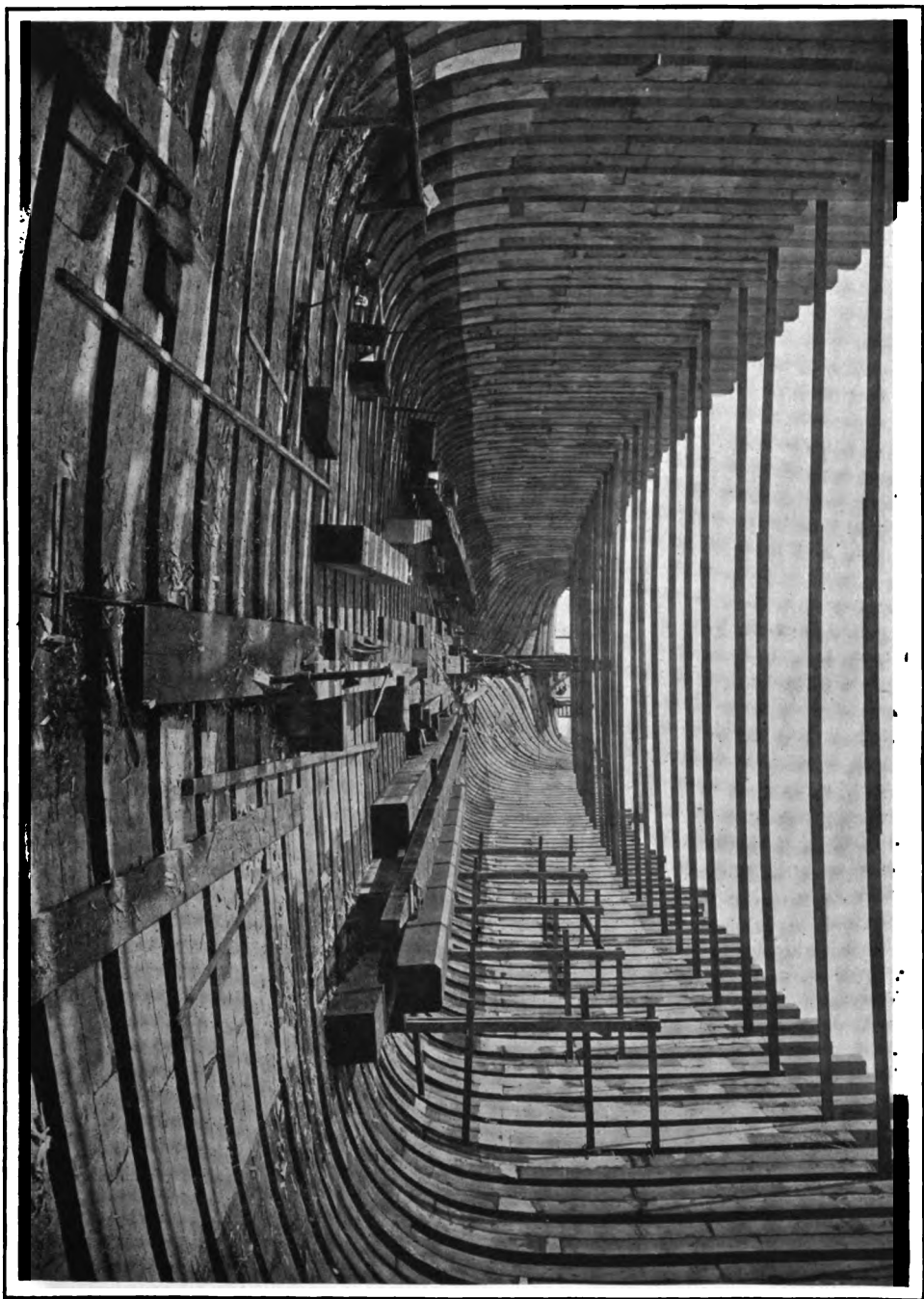


PLATE I—INTERIOR OF HULL.

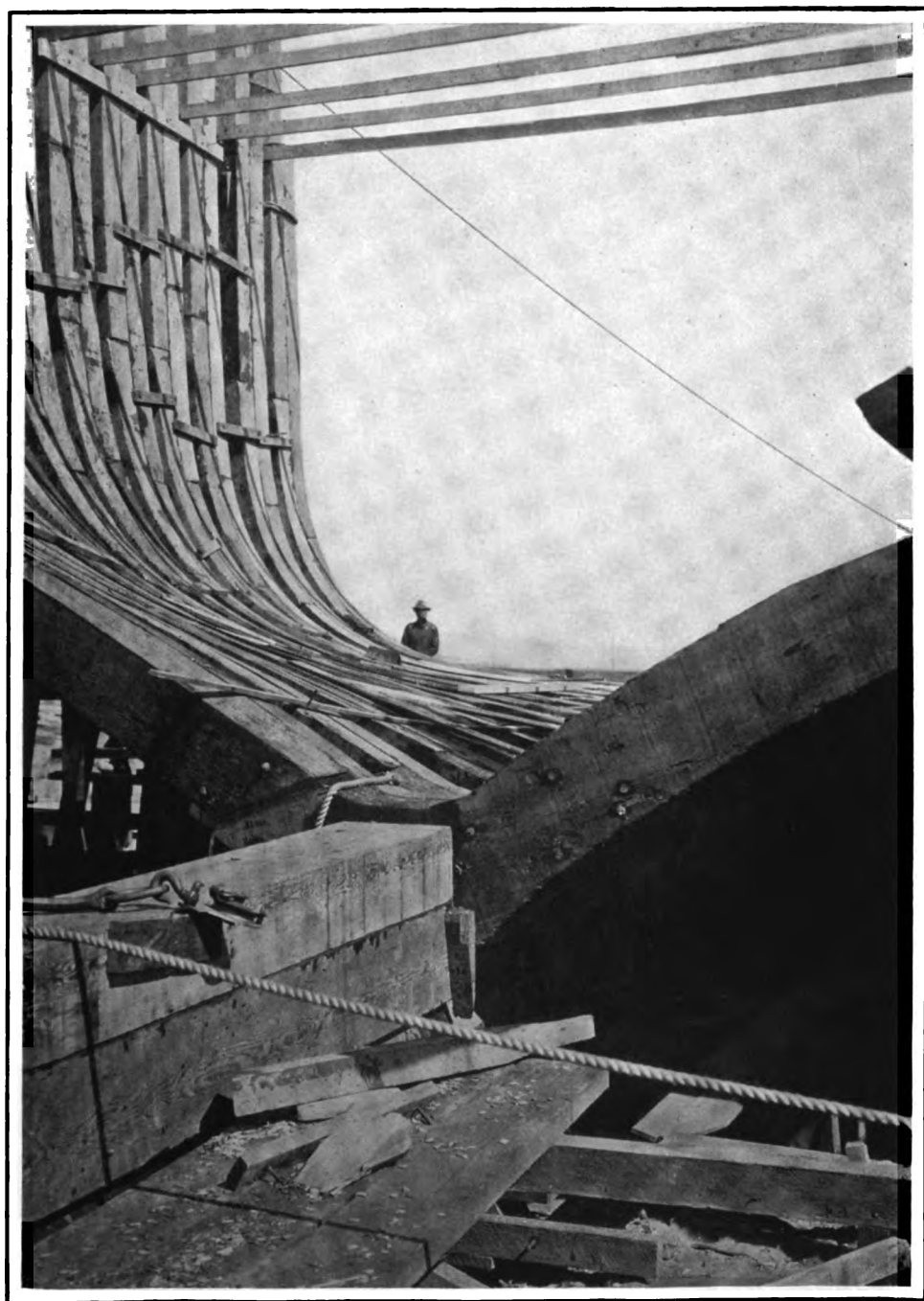


PLATE 2—SHOWING SIZE OF TIMBERS AND FRAMES

frames and ribs are sawed out of massive blocks called "fitches," 12 to 14 inches thick and 27 to 30 inches in width, or depth, where bolted to the keel. When steel prices get down to a more normal basis, steel will probably be used to a greater or less extent for reinforcement in wooden ships, making somewhat lighter construction.

The revival in the building of wooden ships, under the pressure for quick delivery, already has stimulated the working out of many improvements in machinery and labor-saving devices, which were not thought of in the old days of the industry, and are made possible by the use of electric power and compressed air. A very useful crane has been devised, somewhat like a Gantry crane, built of timber and using an electric motor, one of these cranes serving a pair of ships and being capable of lifting a completed frame, which is made of two fitches tre-nailed together, and dropping it in place over the keel ready for bolting; lifting ceiling planks, stanchions and beams, etc., over the side of the ship and dropping in place. Jig saws and band saws are used for sawing out and beveling, on the lines worked out in the mold-loft, keels, keelsons, frames, ribs, etc. A very ingenious machine has been constructed in one of the Seattle machine shops for doing a variety of work. This machine will do beveling, reversed beveling and curving of frames, planking, ceiling and hatch coamings, surfacing, and "feying" of the knees, and other work.

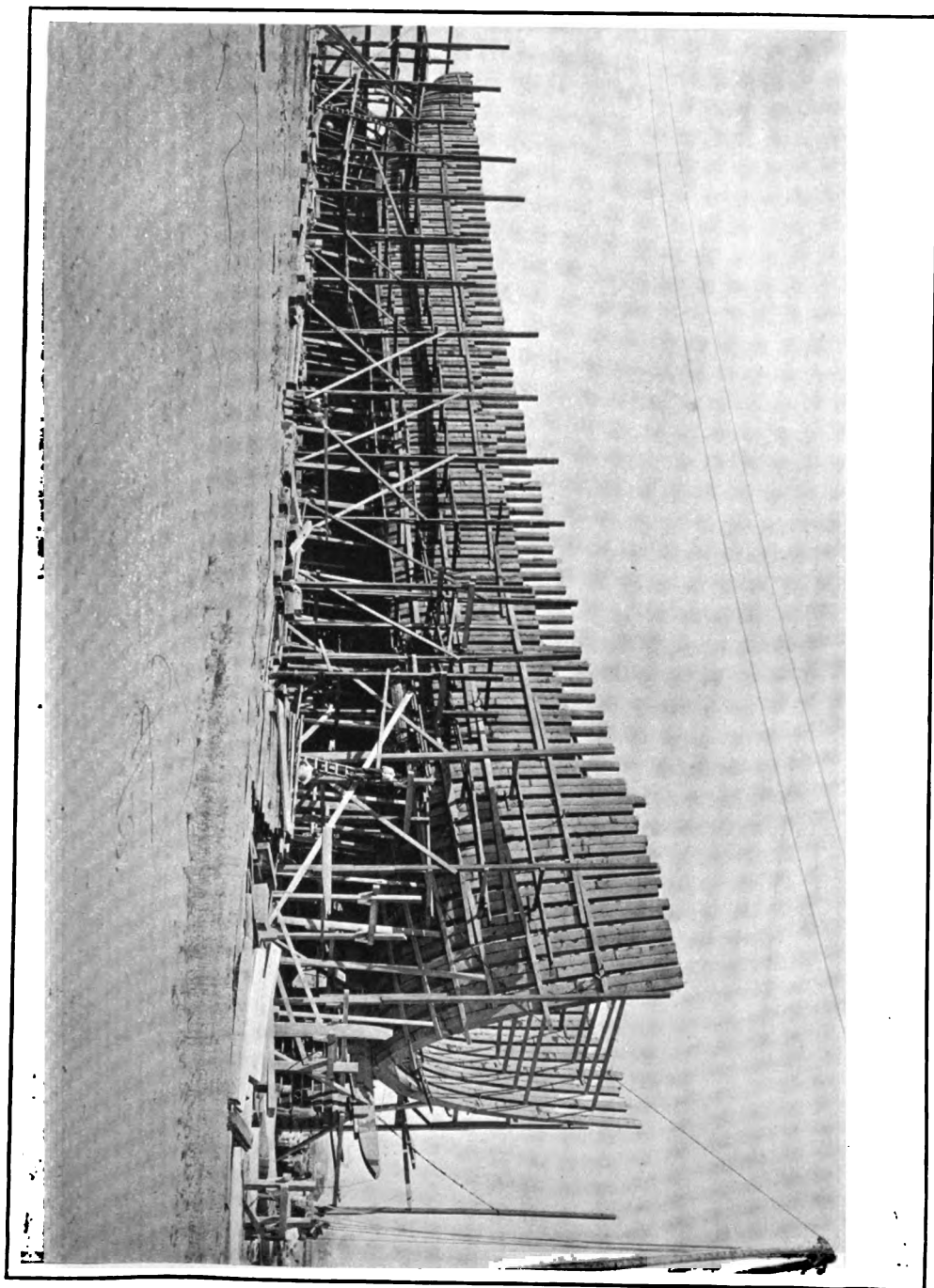
The getting out of ship knees has become quite a large industry. These are made from fir stumps that are full of pitch, making good hard wood. Two or three hundred knees are used in each ship, and incidentally this provides quite a revenue to farmers and other owners of logged off lands, in the sale of stumps.

The accompanying photographs will give an idea of the size of the timbers and frames, three 100-foot sticks being used for the keel, and the frames, as shown best in No. 2, being 28 inches deep over the keel. No. 4 shows a crew getting a frame into place before the crane was in use, which now admits of putting the frames together on the ground away from the ship, picking them up and dropping them in place in an upright position. One of these wooden ships requires about a million and a quarter feet of lumber for her construction. In the bald-headed schooners the masts, of a single stick, are 128 feet long.

Seattle's water borne trade has in the past two years gone

up by leaps and bounds, and last year Seattle was the fourth port in the United States in total of imports and exports. This trade is not confined by any means to munitions and war supplies, although these constitute between 25 and 30 per cent, but comprises all sorts of commodities. It is to be regretted that some 85 per cent of the commerce, other than coastwise, is carried in foreign ships, and it is to be hoped that Congress and the new Shipping Board will be wise enough and courageous enough to seize the opportunity offered by the revival of ship-building in this country and the interest being taken in shipping so to amend our treaties, shipping laws and Bureau of Navigation regulations that we may build up an American owned merchant marine; that our ship owners will be encouraged and enabled to sail their ships under the American flag, thus creating a vast new industry in this country, and by its means keeping at home the hundreds of millions of dollars paid annually, before the war, to foreign ship owners in freight and passage money.

PLATE 3—WOODEN VESSEL UNDER CONSTRUCTION



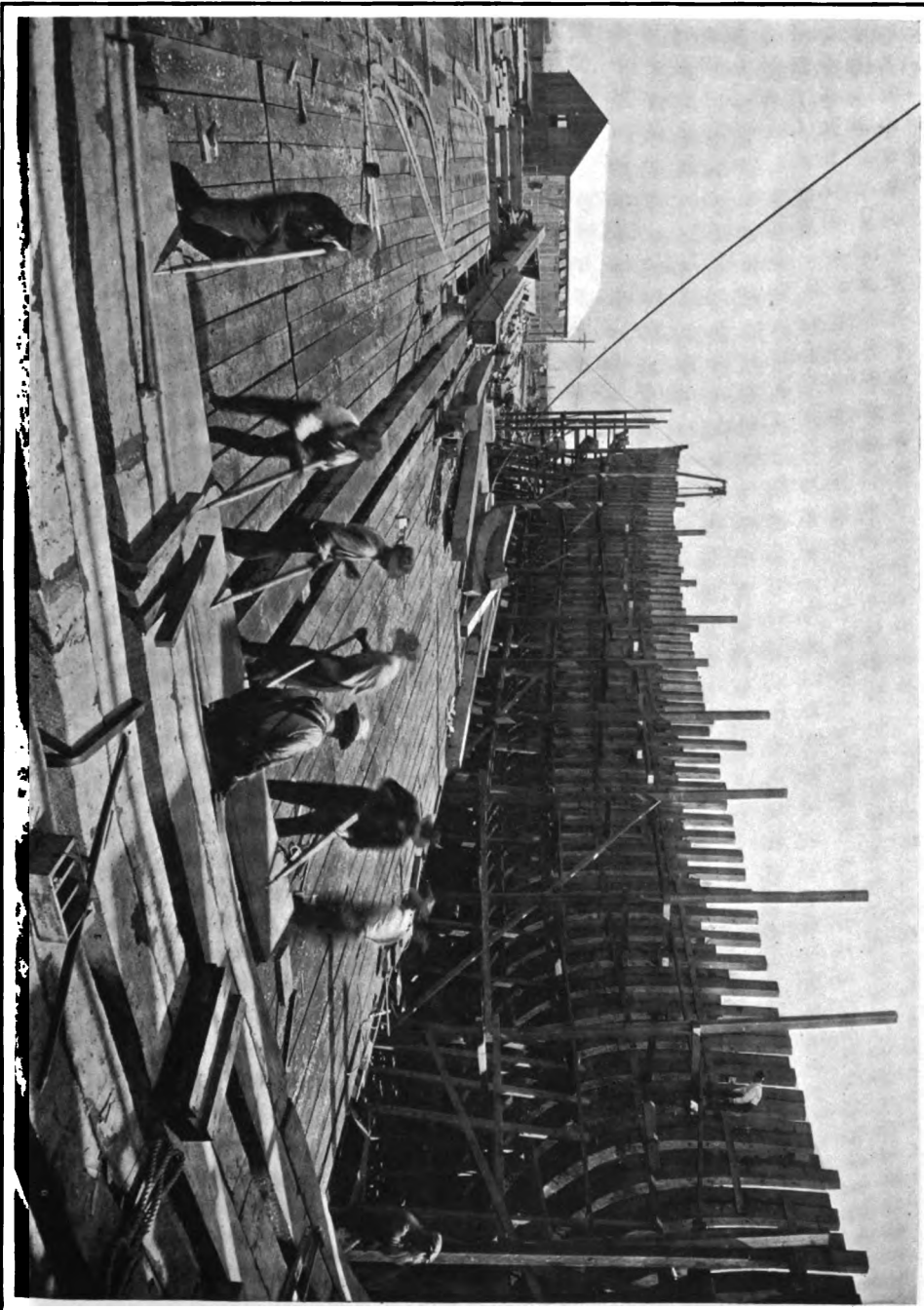


PLATE 4.—GETTING A FRAME INTO PLACE BEFORE THE CRANE WAS IN USE

RELATION OF THE ELECTRIC STEEL FURNACE TO CENTRAL STATION SUPPLY

BY NORMAN T. WILCOX

Outside of the steel trade itself few people appreciate the rapid growth in the use of electric furnaces for the production of the highest grades of steel and steel castings. This growth has for the most part occurred within the last five years, the greater portion of the increase occurring within the last year or two.

Up to March 1, 1917, at least 158 steel making electric furnaces had been contracted for or were at that time in actual commercial service in the United States. These furnaces, when operated twenty-four hours a day, six days in the week would have a total capacity of 1,000,000 tons of steel per annum. This would represent an energy consumption of at least 600,000,000 kilowatt hours per annum, a large portion of which should be supplied from public utility sources.

Because of the greater freedom from segregation and greater homogeneity, electric steel is somewhat higher in tensile strength and elastic limit than steels made by other processes and, owing to its greater density, the electric steel shows a marked resistance to fatigue. Uniformity of quality is also a marked characteristic of electric steel.

No doubt the discovery that the best crucible quality of steel can be made in the electric furnace and the further fact that crucibles have become almost prohibitive in price has contributed greatly to a rapid realization of the great practical value of the electric furnace.

In the open-hearth furnace the melting is accomplished by a flame which, under the best conditions, is oxidizing in its nature. In the basic open-hearth process carbon, phosphorus, silicon, manganese and some sulphur are removed from the bath. In the acid open-hearth process only carbon, silicon and manganese are removed.

In the electric furnace where the heat is produced by an electric arc, it is possible to melt and refine a charge of metal in a neutral or reducing atmosphere free from foreign materials incident to the use of an air blast as used in the open-hearth furnaces.

In the electric furnace the refining may be practically

carried to a much higher degree of perfection than is possible with other methods.

All methods of steel making except the electric furnace have quite definite and limited fields of use. On the other hand, the electric furnace can be used to produce steel equivalent to any of those obtained through the other processes. Looking at the situation broadly, it may be stated that when the electric furnace is used for melting and refining in many cases where superiority of product is essential it competes successfully with the open-hearth furnace. This is because the increased cost incident to the use of electric power for melting is offset by the advantages of refining which are incident to the use of the electric furnace.

A crucible furnace does not make any better steel than can be made commercially by the use of a good electric furnace and is handicapped by the necessity of careful selection of raw material. The use of the electric furnace puts the manufacturer in a position independent of the high labor costs and high cost of the extra select materials necessary for the production of best quality crucible steel.

With a fair sized furnace, good raw material and 24-hour operation, 600 kilowatt hours per ton should be sufficient for the manufacture of ordinary high grade steels. Carbon steel may require a little less and some alloy steels may use a little more than 600 kilowatt hours per ton of melted metal. If the melted metal is not poured quite close to the furnace but is carried to some distance before it reaches the mold, then extra energy will be required to offset the heat losses during the period that elapses before the metal is poured. This means a greater number of kilowatt hours per ton. Any delays in handling, due to poor organization of foundry force or to lack of skilful and well-directed operation, will also add materially to the kilowatt hour requirements.

Small furnaces have been developed even in the three-phase type down to capacities as low as one-half ton of metal per heat. At the rate of ten heats of carbon steel for 24-hour operation, this plant would give an output of five tons of melted steel per 24-hour day. A furnace of this size should preferably be operated at from 100 to 125 kilowatts of demand and when operating multi-phase would run on a power factor of approximately ninety per cent.

The larger furnaces as now installed should call for ap-

proximately 250 kilowatts of demand per ton of metal per heat.

In order to obtain all the benefits of the electric furnace it is desirable to possess the ability to rapidly melt down the charge as well as the high range of temperature which makes it possible to obtain the best product.

In order to obtain the rapid melting down, transformer connections should be preferably arranged for more than one voltage, as a comparatively high voltage allows for rapid melting. In order to save the furnace refractories from undue wear it is highly desirable to use the low voltage as soon as the cold charge has been melted.

As many, if not most, of the small furnaces, as well as some of the larger ones, can be so operated as to keep off the peak, the furnace load, from a central station standpoint, is an attractive one. The smaller furnaces should be found useful in many small factory foundries.

Even with the larger furnaces it is not wise to figure on less than 600 kilowatt hours per ton of metal melted although individual heats, especially after the furnace is hot, may show much better results. With small or irregularly operated furnaces a much larger energy consumption is to be expected.

With any good electric arc furnace and good practice on 24-hour operation, 600 kilowatt hours should suffice to melt and refine 2000 pounds of steel. There are several makes that can guarantee this result. Very small units, especially when operated intermittently, will require considerably more than this amount, in some cases running up to as high as 1000 or 1200 kilowatt hours per ton of melted metal.

Some furnace makers, in their enthusiasm and in the absence of accurate commercial data, have no doubt made claims for efficiencies which cannot be obtained in ordinary practice. This is especially true where the operating conditions are not ideal. The usual claims for operating load factors have often been excessive. With cold scrap and even with good administration and six days a week, 24-hour operation, sixty and seventy per cent yearly load factors have not been obtained in commercial practice.

In the case of larger steel works where the furnace takes melted metal and is used only for final refining, undoubtedly better load factors can be obtained than would be possible for the conditions above cited, but this is not a usual condition

such as is likely to be presented to the ordinary central station.

With a single unit furnace plant a 45 per cent load factor would only result from exceedingly good operation. It is obvious that with less hours of service or on special steel requiring delays in super-refining, chemical analysis, etc., lower load factors must be looked for. Owing to the diversity effect, with a greater number of operating furnace units somewhat better load factors may be expected.

In order to make intelligent comparisons as to load factors it is necessary to consider the length of the demand period, otherwise comparisons of rates under various quoted schedules are likely to lead to very erroneous conclusions.

Some companies are charging for furnace business on a two-minute demand basis; others charge on a fifteen- or thirty-minute demand, and some on a three-hour demand basis.

As a furnace load when melting down cold scrap is somewhat similar to an electric railway load that operates with only one or two cars, it will be readily understood that the period of demand will seriously affect the load factor. If all central stations should adopt the thirty-minute demand period (which now seems to be in growing favor) and comparisons are reduced to this basis, no doubt the steel manufacturer and his engineer, as well as the central station salesman, will be materially assisted in coming to correct conclusions.

Load factors herein given are based upon a thirty-minute maximum. It is to be hoped that this plan will be generally adopted so that all may work on an intelligent basis. When a standard demand is more generally used, furnace data will be of greater value to all and we will, no doubt, be confronted with less confusing or erroneous information.

For the station using the multi-phase system of generating and distribution, the multi-phase furnace is most satisfactory, as it does not unbalance the circuits and badly affect the regulation of the system. Except for very small capacities or where unbalancing effects and poor regulation are not objectionable, the single-phase furnace should not be used except in conjunction with a suitable converter to balance the loads on the system. When the single-phase type is used without a converter the low power factor on the system is likely to seriously affect the available capacity of the supplying plant and feeders, especially if the generating equipment and lines are of small capacity. The fluctuating character of the furnace load, es-

pecially when carelessly handled during the period of melting down of the cold scrap, is more serious on low power factor than when a high power factor is attainable.

The power factor and energy in a furnace load should always be measured on the primary side of the supplying transformers and operating data should be based on this condition, not on data obtained on the secondary side of the transformers. This procedure is necessary in order to avoid any errors due to the arc rectifying effect that may at times result in a flow of unidirectional pulsating current in the secondaries of the transformers. The indications of this part of the energy will not appear in the alternating current recording instruments usually used.

It is obvious that in a case such as cited the only way to find the actual amount of power utilized and the resulting energy required will be to make all measurements on the primary side of the transformers. Only arc type furnaces should be considered, as the induction type of furnace does not seem to offer promise of being adaptable to American conditions.

In the effort to secure furnace loads, prior to quoting the rate and engaging to undertake the service, care should be exerted to understand all the conditions of the operation. With proper equipment eighty-five to ninety per cent power factors are attainable, and sometimes even higher power factors occur in practice. Faultily designed equipment or installations may produce such low power factors that the results will be disappointing to the supplying company.

The quality and kind of scrap material used will have a marked effect on the kilowatt hour consumption per ton of product—a condition often lost sight of.

If high grade, low phosphorous, low sulphur scrap is used, less energy will be required and the fixed charges per unit output, as well as other charges per ton of output, such as labor, will be materially less than if inferior materials are used.

If a large amount of oxide in the form of rust and dirt is present in the material used, extra power will be required to deoxidize and reduce this material to a metallic state. This also means a longer period for the smelting process with proportionate decreases in the daily capacity.

If extensive refining is required a basic lined furnace and a competent chemist will be required to produce high grade ma-

terial. On the other hand, if the usual acid lined furnace is used in conjunction with selected scrap, all charges will be materially less. Fortunately the same furnace can be readily adapted to either basic or acid operation, the necessary changes being simple.

Owing to the fact that the metallurgical operations in the electric furnace are carried on in a neutral atmosphere free from air blast conditions and impurities incident to an air blast, by the use of a properly designed arc furnace the highest grades of product can be obtained and with more uniform and satisfactory results than by other methods.

Owing to the superiority of arc furnaces over the crucible method of producing high grade steel, and the further fact that the arc furnace does not necessarily require the highest grade of raw material as does the crucible method, we may confidently expect the crucible method, generally speaking, to become a thing of the past.

As the electric furnace practice is better understood and costs of furnaces become lower in price, we may expect a very general and extensive adoption of smaller size furnaces in many manufacturing plants that have not seriously considered this plan as a practical possibility. This is a promising field for central station endeavor.

The operation of the electric furnace, especially where selected material is used (as must be the case if a crucible plant were used) is ideally simple and satisfactory. The apparatus takes but little space and is more readily handled than the crucibles and crucible furnace, while larger amounts of metal can be handled at one time with success.

While at first it will undoubtedly in many cases be somewhat difficult to convince the foundryman that he can readily do so, it would seem that in the case of many small plants that desire to make their own steel castings, the furnace can be operated during the night and after peak hours until the morning load again requires the use of the central station capacity. In cases where this plan is followed the molding would naturally be done during the day time and the casting at night, a plan which has already been a success in some foundries. This plan enables the foundry to purchase energy at a lower price, as the central station can afford to make concessions for this kind of off-peak load.

The field for the small and moderate sized electric furnace

is a large one and should not be ignored on the part of the central station desirous of obtaining loads which will broaden and extend the use of existing and future equipment.

Although the electric furnace cannot be expected to take the place of the ordinary cupola such as is used for making the common grades of cast iron, we should not lose sight of the fact that the electric furnace is the only apparatus which will successfully produce all grades of material from the same furnace, the products ranging from superior quality cast and malleable iron up through the list of the various grades of steel, including the finest grades of crucible and tool steels.

In some cases it is worth while to seriously consider the installation of an electric steel furnace because of its wide adaptability to the needs of the individual manufacturer in producing a variety of desirable materials and under his own control. More extended experience and better appreciation of the advantages of the electric furnace when properly understood will, no doubt, result in an extensive use of this most useful form of equipment and large power sales that will be of material advantage to both the manufacturer and the central station.

EFFICIENCY AND DEMOCRACY*

BY IRA N. HOLLIS, D. Sc.

What is the greatest question before the world today? It is not the conduct of the war, or the triumph of any nation. It is the relation of government to the individual and the attitude of the individual towards his own government. Is the swing of the pendulum towards freedom, or towards autocracy? I hope it is the former. We Americans all form our opinions and our sympathies in accordance with what we believe to be justice to the individual, whether it be a small nation that is being despoiled, or a man who is being deported. Many of us believe that the whole future of democracy is at stake and that unless democracy can develop as high a national efficiency as autocracy, it is doomed. That is fundamentally the question before the United States today. The war will leave misery behind it, but it will leave the nations cleansed and chastened into a better attitude of mind towards their duty to the future of civilization.

* * *

In discussing the comparative merits of the two governments, democracy, as illustrated by the United States, and aristocracy, as illustrated by Germany, Americans are not always judicial. They are either unduly confident or over sceptical as to the future of our form of government. One writer has shown, to his own satisfaction, that under the democratic form of government, and under the freedom that inevitably comes with it, men have developed more initiative and higher individual efficiency than is to be found where the individual is directed in his work by someone else. A long list of great scientists and writers has been supplied, to show that science and literature flourish better where the individual is unhampered, than in a state under the control of the few. To my mind, however, that finding is rather a prejudiced statement of the case. No nation, from the Greeks up, has had a monopoly of ideas. They have all contributed each in the direction of its own genius. The Greeks, with all their democracies and with all their great

*An address, somewhat abridged, delivered before the Cleveland, Ohio, Chamber of Commerce, January 2, 1917, by the president of the Worcester Polytechnic Institute, who is also president of the American Society of Mechanical Engineers. Reprinted from the Journal of the Worcester Polytechnic Institute.

literature, had not the strength of effectiveness to survive, except in the leaves of a few books and in the treasures of art that were found buried in the ruins of their buildings. It is not well to generalize too much about national efficiency, or about the relation of individual freedom to initiative in invention, and to the development of science.

Is it true that efficiency is best developed under democracy and that in the long run a nation is stronger against war with the individual initiative taught under a democracy, than it could be under an autocracy? Any American would naturally say yes, in the belief that men do better in what they consent and wish to do, than when they act under compulsion. But we should be utterly mistaken if we judged the German nation by that measure. In contrasting Germany with the United States, we have been too quick to take it for granted that German citizens were acting under the compulsion of a military caste. If so, they have been able to hide the evidence of compulsion, because they have freely consented to conscription during the vast military organization under which their people have been prepared for war, and under which their advance in a material way has been beyond the power of the imagination. It may be true that a people left to the loose guidance of those who are elected to office will develop initiative for themselves, and that the individual will gain power thereby. It is not, however, established that such a nation will survive, or that its institutions will last for a long time. The only long-lived democracy is little Switzerland, without a sea coast, and held in stable equilibrium by the pressure of great nations.

* * *

I want to say here that I am a profound believer in democracy as Lincoln defined it. If stripped of certain ugly excrescences, it is the hope of man. Only under it can the millennium ever come. Nevertheless, our government is not what we wish it and it can never amount to anything in war against an autocracy under our present loose ideas on citizenship. I am convinced that men and women must be trained for public office and then entrusted with it as our representatives, not as our mouth-pieces. Too often it has been the refuge of mediocrity and incompetence. Even our Congress has today few men who really know anything about the questions on which they are expected to pass.

The Civil Service has done something to take jobs out

of politics, but we have only just scratched the surface of anything like a real preparation for service to the state or city. With a better citizenship, we should be prepared for many functions now in private hands that really belong to the public. Is the business of transportation any more difficult than the administration of government in other departments, which have always seemed to belong unquestionably to the state? As a matter of fact, men are not selfish, they want to serve if they can put a little of the spirit of emulation and adventure into their service. What induces any young man to volunteer for war? Some call it patriotism, but behind it lurks the splendid spirit of service and adventure, which is at the root of most human activity. This spirit of throwing one's self whole-heartedly into any cause without much thought of self, should make of any democracy a great and a successful contribution to the history of man on this planet. Why then, are we ourselves so skeptical? It is because we have never contemplated our duty to the state as something real and service as the only thing capable of bringing us high satisfaction and happiness.

The Declaration of Independence states that all men are created equal, and that they are endowed by their Creator with certain inalienable rights, that among these are life, liberty and the pursuit of happiness. We have by constant dwelling on the word "equality" twisted it out of the meaning that our forefathers intended to give it. As a matter of fact, the Declaration of Independence was the statement of a noble reaction against bondage in a feudal system and it expressed fundamentally that men should be equal as to opportunity. It could never determine the equality of men as to physical and mental endowments. They are distinctly not equal and never have been, and no fiat can ever make them so. Nature has taken care of that. In our democracy, we should dwell on the equality of opportunity to serve.

That is the true meaning of our Declaration of Independence, and the license that has grown up in America would make of it one of the futile efforts of man, to be followed by some awful reaction against human liberty. The word "liberty" has also been misunderstood. No man has a right to liberty and no man ought to be free in the sense that he can do as he pleases. He must always yield obedience to the claims of society. The only free man is one who lives alone on a desert island.

On the court house in Worcester is this sentence: "Obedi-

ence to Law is Liberty." That obedience to law is a necessary element of true liberty has been the doctrine of philosophers since the dawn of recorded history. We can not deny it, and we know that our country's liberty is less for every violation or disregard of law. In Cambridge, I could not get the fruit from my own trees, on the cars I have suffered no end of imposition, in my home I often have been waked out of a sound sleep by the brawling of young men at one or two o'clock in the morning, all because the laws are not enforced. These are small matters, but they afford some measure of what liberty should mean to the individual. The commissioner of police in one of our largest cities told me that he did not regard Americans as a law-abiding people, and that no one could have any real liberty where all had so much license.

The finest definition of a man's place in our democracy is found in the statement that here he will be permitted to develop himself to his maximum possibility in the service of mankind. That is what the liberty of our Republic means and should mean. Observe the word "permitted" to develop one's self. It signifies that the individual must learn how to use this permission before it becomes really of value to him. If he does not know how, he can never develop himself to any real service to God or man.

How far must the efficiency of the individual give way to the collective efficiency of a large number of individuals, or of the State? An engineer will understand the force of this question, because he is in the habit of effecting compromises in the selection of machinery for manufacturing or power purposes. In steamships, for instance, it is a well known principle that a screw propeller generates its highest efficiency at a comparatively low speed of rotation, while a steam turbine is quite the opposite in reaching its highest efficiency at a very high rate of speed. When they are coupled together for propulsion, both must surrender something in order that their combined effort may produce the maximum result. Every power station is planned on exactly the same principle, often with every element working at a lower efficiency in order that the united effort may supply current at a minimum cost.

In the same way, every individual of every community should consider his conduct and his work as affecting all others with whom he is associated, and all others who live under the same flag. If his efficiency in business becomes so great and so

distorted that it interferes with the rights and the happiness of others, it must be curbed and checked so that the maximum of service and happiness will be found for all.

It is the combined effort that we are seeking, not the glory or power of the individual. If society has sacrificed itself to lift higher some man or woman, society has failed unless some future generation is the better for the sacrifice.

The chief danger to any democracy grows out of a false standard. We know in our hearts that the ideals of this country are clean and sound, and yet we stimulate enterprise and initiative by an appeal to the most selfish side of human nature. The patent laws, the entry of public land and the rights to property, all good within limits, have produced most of the litigation because they are based on selfishness, and the worst of it is that few can see any other practicable or possible method of holding society together. It is a false standard, and there is something better in our love of fair play, our charity to our neighbors, our passion to pay and our desire to serve. If we can only let them sway us in relation to our own government as in private life, the republic will be safe for all time and democracy will win the earth.

* * *

Has any healthy and mentally sound individual a place in any community to which he renders no service or where he makes no contribution to the welfare of the state? This sounds like harsh puritanism; and yet it is not, when you stop to think about it. There is in machinery a quality known as hunting. It is found in the steam engine when the governor has a high, initial resistance. If the speed increases and the governor does not act, the engine will run away until the governor does act; then, it will act too much and carry the engine to the other extreme. This bad quality may be improved, but hunting is always present even in the turbines that supply your power and light. The engine is all the time hunting the average normal speed without ever finding it. In many respects, humanity is like that, always striving and never attaining.

* * *

If I accomplish nothing else than to call your attention to an essay by William James on "The Moral Equivalent of War," I shall be satisfied with my visit to Cleveland. He has given us one of the noblest conceptions of man's future, and, best of all, the way out of blood and crime. In the first paragraph of his

essay he says, "The military feelings are too deeply grounded to abdicate their place among our ideals until better substitutes are offered than the glory and shame that come to nations as well as to individuals from the ups and downs of politics and the vicissitudes of trade. There is something highly paradoxical in the modern man's relation to war. Ask all our millions, north and south, whether they would vote now (were such a thing possible) to have our war for the Union expunged from history, and the record of a peaceful transition to the present time substituted for that of its marches and battles, and probably hardly a handful of eccentrics would say yes. Those ancestors, those efforts, those memories and legends, are the most ideal part of what we now own together, a sacred spiritual possession worth more than all the blood poured out. Yet ask those same people whether they would be willing in cold blood to start another civil war now to gain another similar possession, and not one man or woman would vote for the proposition."

What relation has this to the state of mind of the American people? We have had no end of discussion about national defense, the Army and Navy, and universal military service. War is clearly in the air, and anyone of several questions might bring it like a thunder clap. Not one man or woman would vote for it, but we are in the hands of fate. Will it be possible for any nation to remain neutral in the next war, or in this, if it lasts out another summer? I am a believer in thorough preparedness immediately, and yet I am persuaded that we have taken the public mind away from what should be the great ideal of our republic by emphasizing the word "military" at the expense of the word "service." It is service in every direction that is needed, and no young man can discharge his obligation to his country by a few months in camp. The whole matter hinges on a state of mind.

The constant use of the word "military" has set men at odds who are not opposed to each other at all. For instance, the introduction of military drill into the public schools, instead of arousing controversy, can be justified even for little children, if we call it physical exercise, which it really is, and a most excellent form of physical exercise, derived from long experience in the gymnasium and in the setting-up drill of the army.

Of course, military training may form part of any collective training for the service of the country, but it is not the chief one. Mr. James has said, "All qualities of a man acquire dignity

when he knows that the service of the country that owns him needs them." "So long as anti-militarists propose no substitute for war's disciplinary function, no moral equivalent of war, analogous, as one might say, to the mechanical equivalent of heat, so long they fail to realize the full inwardness of the situation. And as a rule they do fail. The duties, penalties and sanctions pictured in the utopias they paint are all too weak and tame to touch the military-minded." "All these beliefs of mine put me squarely into the anti-militarist party. But I do not believe that peace either ought to be or will be permanent on this globe, unless the states pacifically organized preserve some of the old elements of army-discipline."

"Martial virtues must be the enduring cement; intrepidity, contempt of softness, surrender of private interest, obedience to command, must still remain the rock upon which states are built—unless indeed, we wish for dangerous reactions against commonwealths fit only for contempt, and liable to invite attack whenever a center of crystallization for military-minded enterprise gets formed anywhere in their neighborhood." . . . "Why should men not some day feel that it is worth a blood-tax to belong to a collectivity superior in any ideal respect? Why should they not blush with indignant shame if the community that owns them is vile in any way whatsoever? Individuals, daily more numerous, now feel this civic passion. It is only a question of blowing on the spark till the whole population gets incandescent, and on the ruins of the old morals of military honor, a stable system of morals of civic honor builds itself up."

"If now—and this is my idea—there were, instead of military conscription, a conscription of the whole youthful population to form for a certain number of years a part of the army enlisted against nature, the injustice would tend to be evened out, and numerous other goods to the commonwealth would follow. The military ideals of hardihood and discipline would be wrought into the growing fiber of the people; no one would remain blind as the luxurious classes now are blind, to man's real relations to the globe he lives on, and to the permanently sour and hard foundations of his higher life. To coal and iron mines, to freight trains, to fishing fleets in December, to dishwashing, clothes-washing and window-washing, to road-building and tunnel-making, to foundries and stoke-holes, and to the frames of skyscrapers, would our gilded youths be drafted off, according to their choice, to get the childishness knocked out of them,

and to come back into society with healthier sympathies and soberer ideas. They would have paid their blood-tax, done their own part in the immemorial human warfare against nature."

Perhaps the settled idea of all this writing is found in the last sentence of the following paragraph: "The martial type of character can be bred without war. Strenuous honor and disinterestedness abound elsewhere. Priests and medical men are in a fashion educated to it, and we should all feel some degree of it imperative if we were conscious of our work as an obligatory service to the state." After all, it is Service that Mr. James is putting forward as the only antidote to decadence.

How can efficiency be promoted in a democracy? We must again keep in our minds the fact that there are two efficiencies: one, the efficiency of the individual; the other, the efficiency of the collective mass. Our efficiency as a whole will maintain the republic, but the efficiency of the individual, acting alone, will create such division as to destroy it. That of the individual is soundly promoted by complete freedom of speech, complete freedom of choice as to a career, and by a preservation of the ideals of service as distinguished from self indulgence. We have the first two of these eminently developed in the United States, but the last has been clouded over. We have leaned too much on literature and art as representing the higher things, in comparison with the utilities of life. As a matter of fact, neither one of them is worthy of consideration if carried to a debauch. We do not fix our high moral purpose by reading some beautiful piece of literature or looking at some great picture or by making a lot of money on some invention, but we get it by the experience of life, if that experience takes the proper perspective. It is Christ's conception of life and service that will give us efficiency as individuals in dealing with others. We are too easily misled by college professors into the belief that critical study forms the broadening and enlarging developer of man's soul and mind. Colleges have been comparatively inefficient in turning the mind towards that kind of universal service that will create in this country a united nation. The popular idea that colleges are failures in respect to public service is exaggerated, and yet one can not but feel that they have achieved far less than might have been hoped from their claims of breadth and education.

The efficiency of the collective mass may be promoted in either of two ways: by imposition from above or by mutual agreement. The only difficulty with the latter type of collective

action is that it leaves the individual free to do as he pleases unless some fundamental idea of obedience has been taught. The inability or the disinclination to obey renders collective action in the government and in the industries almost impossible. That is the chief lesson that we shall have to learn in this country and that is the chief value of some type of universal service, including, as a very important part of it, military training.

My belief is that Professor James has suggested the best solution possible in the words, "If now there were, instead of military conscription, a conscription of the whole youthful population to form for a certain number of years a part of the army enlisted against nature, injustice would tend to be evened out and numerous other goods to the commonwealth would follow." It is not necessary here to suggest the elements of the warfare against nature. One of them, however, comes readily to mind. Instead of an appropriation of millions by the government of the United States and by the states to build the great Lincoln Highway across the continent, suppose that the work on this Highway were a free gift of our young men, under universal service. We should then have an enduring monument to love of country and an ennobling incentive to the right kind of patriotism. That great artery of commerce and recreation would hold memories of splendid achievement for generations to come and it would bind the states far better than interstate laws.

All the men who have worked at the Panama Canal will carry to their graves the consciousness of their share in one of the great achievements of man. Can anything be better than this? Instead of having overcome an enemy by the killing of men, we have overcome disease in an undertaking which twenty-five or thirty years ago would have killed thousands. Old reports state that the Panama railway has a skeleton beneath every cross tie. The type of citizenship given to us by men like Goethals and Gorgas is our most precious possession.

It has been said that men coming back from a war are far more efficient through having learned obedience and unity of action. We constantly see that statement in reference to the future effects of the European war when nations shall have gone back to the arts of peace with disciplined men to compete against the United States which has grown soft while benefiting from the war sales. Here, too, does not universal service offer a way out? One can not be too definite, because it will remain for the

years to solve this problem, and yet I can imagine nothing better for a boy of twenty than a few months in the Plattsburg camp, living under military conditions, and then two years' service to the state under semi-military conditions, in camp life or otherwise, in the upbuilding of our means of communication.

The Lincoln Highway is only one of many things that can be offered by the youth of the country. There might be a Washington Highway from Maine to Texas passing through the mountains of Kentucky and Tennessee. The mind can suggest a thousand other great utilities. It has been claimed that service under the flag in Germany and France has served to educate the people. That is a pure preparation for war which has been going on during the past fifty years as the means of educating the masses. I do not believe for one instant that it offers half the stimulus that constructive service in peace would bring to our youth. All the discipline of the army can be found in the working party with the pick and shovel taking the place of the rifle.

Of course, in any plans for the future, we are forced to consider the immediate needs of the country. Our neglect has been too long and too deep seated. We can no longer think nationally, and a new consciousness of the importance of every locality to every other in the whole land must grow under a thorough-going preparedness for the future. The West must understand that when it is protecting the seacoast from invasion it is protecting itself, and the East must learn the vital questions relating to the agriculture of the West, as well as to the immigration of the Chinese on the coast. Our preparedness has already taken the form of great appropriations for the Army and Navy, which should have been provided long ago. The country bids fair in the course of time, unless our policy reverts to the spasmodic action of former years, to have a Navy to hold off any possible enemy long enough to get ready on land, and to protect certain outposts, like the Panama Canal, the Hawaiian Islands and Alaska. If the more remote outposts could be given up and our attention confined to our possessions inside of the great rectangle on the Mercator chart bounded by a meridian 50 degrees west and another meridian 170 degrees west, and by the equator, we should be better off, and we should find it much easier to take care of our own. A "Monroe Doctrine" within these limits is natural and right.

The Army never will be in a satisfactory condition until we get rid of the dual control involved in the state militia idea and

substitute for it a citizen soldiery with only a nucleus of men permanently under arms. This involves, of course, the Swiss system or the Australian system of universal training, beginning in the public schools and continuing for ten or fifteen years.

The appropriations are only stop-gaps, however, and we must provide a lasting remedy for the loose, flabby ideas of service heretofore held by too many of our voters. Mr. James and General Wood, the one addressing the confirmed Pacifists and the other bringing to the attention of the unprejudiced but thoughtless multitude the value of universal military training, have suggested ideas for the long future of peace. Our main task is only begun, that of arousing a national spirit by every means in our power. Industrial preparedness is only a small part of it. Co-operation in everything is demanded, in education, in religion, in the industries and in citizenship, for the purpose of fusing this conglomerate population into a united, efficient and peaceful nation, capable of serving and advancing civilization. Let us do our share!

SAFETY WORK IN TACOMA SCHOOLS*

BY T. N. HENRY

The work of safety organization and instruction in the schools of Tacoma and the towns and villages in the territory served by the Puget Sound Electric Railway was carried forward during the year just closed on the same general lines as those followed during the year next preceding, details of which will be found in my report for the year ending December 31, 1915.

During the year every public school room in Tacoma and the P. S. E. territory was reached with our safety lectures and literature, a set of large water-color pictures illustrative of dangerous practices and conditions involving children on the streets, in and about street cars and elsewhere being used in connection with the talks. These pictures served very effectively to get and hold the interest and attention of children and to give point to the rules and safety lessons.

In twenty-one of the twenty-five Tacoma schools having pupils in advance of the primary grades, the principals and teachers joined heartily in the work, and in each of these a pupil's safety committee was organized under our School Safety Scout plan. The fine spirit in which these principals and teachers joined in the movement, led by City Superintendent William F. Geiger, who commended our plan and urged co-operation in the work through a number of official bulletins, resulted in much interest in the details of the movement on the part of children in all departments of the schools. The Safety Scout button, to win which under the rules a pupil was required to memorize a specified list of twenty safety rules and to make a record of excellence in living up to all Safety Scout rules, was awarded to 1347 pupils,—boys and girls—ranging in age from ten to seventeen years. The pupil who won the button became a full fledged Safety Scout, and the official recognition accorded the movement by both the school administration and other municipal departments and officials has served to give to this little emblem a significance in Tacoma that causes the Safety Scout—boy or girl—to wear it with considerable pride.

*This work was undertaken by the Tacoma Railway & Power Company and the Puget Sound Electric Railway under the direction of Mr. Henry. The above is from his annual report.

After our work got well under way in the schools it attracted the attention of the parent-teacher associations of the various districts of the city and your lecturer was invited to address a number of these. In these addresses the general safety movement throughout the country, with statistics showing the need for it, was briefly sketched, our own school work and plans explained and these organizations appealed to for co-operation.

In the name of the Tacoma Local of the National Safety Council a "Council Scout Commission" was offered to the two pupils in each school room of the city who during the test period ending May 10, 1916, made the best record under Safety Scout rules. The winners of these "commissions" are ranked as "Commission Safety Scouts" and with their teachers were the honor guests of the company at the Annual Safety Scout Picnic held at Spanaway Park on Saturday, June 10, a week before the close of the schools for the summer vacation. Three hundred and twelve pupils won this "commission" and attended the picnic, the representation from each school being in charge of a number of teachers or members of the schools' parent-teacher association invited by the school principal for that purpose.

To the school in which the largest percentage of pupils qualified for the Safety Scout button was awarded by the company a standard United States flag of size suitable for display on the school's official flagstaff. At the school winning this honor, on June 15, public presentation ceremonies were held and were participated in by the pupils of the school, a number of persons prominently connected with the city school administration and with parent-teacher associations, the Safety Scout Masters from twenty other schools, and your safety lecturer, who represented the company in a short presentation address.

On April 15, 1916, the Tacoma Safety Scout League was organized by the Safety Scout Masters and other representatives from the twenty-one schools of the city having Safety Scout committees. This organization was formed at the suggestion of the undersigned and upon plans proposed by him. The League is the central organization of the School Safety Scouts of the city, and its purposes as set forth in its constitution are, in part, "to exchange ideas and information as to methods of carrying on the work of school safety committees; to unite all the girls and boys of the Tacoma schools for interesting all

citizens in Safety Scout rules; to seek the advice and counsel of other organizations and persons interested in safety work." This organization has an Advisory Council of honorary members, including prominent citizens at the head of various organization, industrial and otherwise, and a number of the official heads of municipal government departments. The second convention of this league, held on the 9th of last month, had in attendance, in addition to the pupil-representatives from the schools, a number of representatives from various school and municipal departments and civic organizations, and received extended and favorable publicity in the daily press of the city.

For the use of pupils and teachers for the current school year we published a 12-page booklet, the "Safety Scout Guide," with substantial tag-board cover, in sufficient quantity to supply a copy to each pupil in the grammar schools of the city. Through this means a great impetus has been given to the work since the opening of schools the past September, as the number of pupils who have thus far since that time memorized the Safety Scout rules and are otherwise active as candidates for Safety Scout honors, the button, etc., is more than double that shown at the corresponding stage of the campaign last year.

In the work with the schools of the P. S. E. territory for the school year ending June 30, 1916, no prize or award was offered pupils for safety activities, but since the September opening of schools this year we are offering the Safety Scout button on practically the same terms as in Tacoma and a U. S. flag, as in the city, to the school making the best showing. This has largely increased the interest in these schools.

The work in the city schools, known to the public as the "Safety Scout Movement," has attained the footing of a recognized civic and educational activity of high importance. Its purposes and plans of work, together with the fact that this company is promoting it, are familiar to a large majority of the citizens, and expressions of approval are to be heard daily from men and women in all walks of life. In the beginning it was not an easy matter to secure proper publicity for the movement, as news, through the daily press of the city, but with its growth and its advertisement in the homes by the children it has become an attractive source of "news" to city editors, so that now the announcement that a Safety Scout company is to be "mustered" and presented with buttons at a given school insures not

only the presence of reporters to witness and report the ceremonies but the attendance of staff photographers to secure pictures for use with the news reports.

I seldom visit a school or school room that some incident is not related by some teacher or child, or some remark made, indicating the profound impression upon the minds of the youth of Tacoma and the general and intelligent activity on their part for safety and accident prevention, that have been induced by this movement as promoted by your department.

Considering the footing upon which the work now stands with the school administration and the favorable light in which it is considered by the public generally, there is every reason to believe that the results during the present school year in the way of bringing children into the "Safety Habit" and enlisting the co-operation of parents, other adults and organizations will far surpass the accomplishments of last year.

THE STONE & WEBSTER ORGANIZATION AND THE WAR

To the Members of the Organization:

During the past few weeks many members of the organization have requested advice as to action they should take in the present national emergency. A uniform answer to these questions is impossible because personal conditions and duties vary with each individual, but it may be helpful for us to state our general ideas and place before the organization all information now available with reference to possible service through the organization itself.

The members of the firm are all heartily in favor of universal military service under some plan which will give a general military training to all young men before they become established in business and before they have families dependent upon them for support. It is our hope that Congress at the coming session will pass a Bill providing for such training, but if a call for volunteers is made instead, we think that every young man between the ages of 18 and 22 should consider very seriously whether it is not his duty to respond to the call. Older men will naturally give consideration to the same question, but it seems to us that the duty to enlist at this time rests primarily with the younger men because the productive activities of the country will be less disturbed by their leaving their present occupations than by similar action on the part of the older and more experienced men.

In considering this question, each man must necessarily act for himself, but before taking final action we think he should consider very carefully how he personally can be of the greatest use to the country. If he has technical training and experience, or if he is employed in any industry which may contribute services or a product which will be needed during a period of war, it is quite possible that he may best serve his country by devoting his time and energy along lines with which he is already familiar rather than by enlisting for active service in the Army or Navy.

We understand that England found herself considerably handicapped during an early stage of the war because many of her technically trained men and others who had knowledge of manufacture enlisted and went to the front. It left the home forces inadequate to carry on the necessary branches of manufacture, and we understand that men were brought back from the front to overcome this difficulty. The need for properly trained men in certain lines of industry in this country may be particularly important in the immediate future because our greatest value to the Allies, if we enter the war, is likely to be through furnishing them with supplies and manufactured products of various kinds, and through assisting them in financing their requirements. The mobilization of industry, therefore, may assume almost equal importance with the mobilization of an adequate army and navy.

As we see it then, the duty of each man, particularly those having others dependent on them for support, is to study his own personal case calmly and carefully, and neither to permit himself to be carried away by too enthusiastic a desire for active service nor to neglect his duty to enlist if he is unable to serve to greater advantage in some other way.

Our own organization offers two opportunities for service:—

First: The operation of our public utilities must be continued to permit the various communities to carry on their industrial work. Certain utility employees may be spared and their places filled by older men or women, but executives and technically trained men may render the most effective service to the country by remaining at their post .

Second: During the last two months we have had several conferences with representatives of the War Department to see whether our organization as a whole could be helpful to the Government. We have ascertained definitely that the Government will have a very considerable amount of engineering and construction work which must be performed with more than ordinary rapidity, to provide adequately and quickly for the equipment of even a moderate sized army and navy. A representative of the War Department visited our office to familiarize himself with the character of our work and the facilities which we have to offer, and at his request we have submitted a letter to the Government, offering the services of our organization for engineering and construction work at cost.

One large piece of work for the Ordnance Department has been discussed in detail and if Congress appropriates the necessary funds we expect the work will be given us. Other jobs for the Navy Department are under discussion and it seems probable that within two months we may be doing a good deal of work for the Government. If so, there will be ample opportunity for every member of the organization to render valuable service. The experience which we have had in working together in the past, the executive ability of the organization as a whole, and the technical skill of its members will become immediately available to the Government, and through co-operation as an organization we should be able to accomplish results of far greater value than would be possible through separate individual effort. We do not wish to over-emphasize this point, but it may offer such an exceptional opportunity for service that it is our duty to bring it to your attention that you may give it proper consideration in making your own plans for the immediate future.

We have also had inquiries from members of the organization with reference to the payment of salaries during the period of enlistment. If it were possible, we would be glad to continue all employees on the pay roll and hold positions open for them for their return as was done when the Militia was recently sent to the Mexican border. The present situation is, however, so much larger in its possibilities and uncertainties that no definite plan of this kind can be decided on at this time. With such a large organization and no knowledge as to the extent of our participation in the war, it is obvious that we can not undertake to maintain salaries during the enlistment period. The firm will use every effort to re-employ men who enlist when they are discharged from military service, and will do everything it reasonably can to be of assistance to the families of all enlisted men.

Boston, April 2, 1917.

STONE & WEBSTER.

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The managers of the companies operated by Stone & Webster write to the Management Division of Stone & Webster about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Baton Rouge, La., March 16th:

Building permits for February, 1917, were valued at \$31,708, against \$29,699 last year.

Post office receipts for February, 1917, were \$6,542, against \$5,656 last year.

The average number of employees of the Standard Oil Company for February, 1917, were 2,287, against 2,069 last year.

The prosperity which Baton Rouge enjoyed during 1916 shows no signs of diminution in 1917, indications being that 1917 will even surpass 1916. The Yazoo & Mississippi Valley Railway Company has announced plans for an expenditure of \$350,000 on its property in Baton Rouge. Plans call for, first, a complete remodeling and extension of the present depot in Baton Rouge which will more than double its size; second, double tracking the road to the Standard Oil Refinery; third, the erection of a modern depot at Scotland at the Standard Oil Refinery; fourth, the erection of a coaling station of 3,000 tons capacity just north of the city, which will be the largest coaling station on the company's lines with the exception of the one at Memphis. Work on the coaling station has already been started and construction on the balance of the work will begin as soon as the necessary material arrives.

The city abattoir, which has been in operation only a little more than a year and a half, has been so successful that it has been found necessary to make enlargements. This work will cost about \$22,000 and will more than double the capacity of the plant. It is expected that this work will be completed inside of three months and will make a total investment of \$50,000 in this plant.

The prospects of the coming months are bright.

Bellingham, Wash., March 14th:

Building permits at Bellingham for February, 1917, were valued at \$12,290, against \$16,115 last year.

Post office receipts at Bellingham for February, 1917, were \$5,645, against \$5,556 last year.

Business conditions in this territory are chiefly affected by agriculture, the lumber market, and the salmon run. The farmers here as elsewhere are greatly benefited by the prevailing high prices. Dairymen who purchase their feed are being benefited to a less extent. The heavy demand for lumber has existed for about a year and for almost the same period the benefit from this demand has been minimized by the impos-

sibility of getting sufficient cars. The mills have many orders on hand, however, and as soon as the car situation eases up they will be able to convert them into money. As it is, all the mills have operated continuously for the past twelve months and their employees have had a chance to save money.

It is in the fishing industry that the greatest activity has occurred, and as a result of the enterprise of the Pacific American Fisheries and a number of smaller fish canning companies, this city is rapidly forging to the front among the world's fish markets. During the last three years, local interests have purchased and built some fifteen salmon canneries along the west and southwest coasts of Alaska, most of the men, machinery and operating supplies for these establishments being sent north from this city each spring. This year, in expectation of a heavy pack, the cannerymen are investing more money than ever before.

It is stated in this morning's news that the Interstate Commerce Commission is considering transcontinental rates on a mileage basis; in other words, disregarding the factor of water competition. This action, if taken, will greatly reduce the advantages heretofore had by our Pacific Coast cities over the mountain cities, by closing to our coast wholesalers much territory east of the Cascade Range and correspondingly benefiting much interior cities as Spokane and Salt Lake City. However, this cannot affect business within the next few months, and barring the contingency of war, we believe conditions here should continue to improve in all lines of business.

Railway receipts were favorably affected by increases in the number of employees at the South Bellingham shipyards and the canneries and by the operation of one-man cars on the York-Addition Court House line. Light and power receipts increased heavily. This is due almost entirely to the steady operation of the cement plants at Concrete, although every account showed some gain, the jobbing and commercial power business reflecting the general improvement in conditions.

Post office receipts at Mt. Vernon, Sedro Woolley and Burlington combined for February, 1917, were \$2,135, against \$2,020 last year.

Reports from these centers state that owing to high prices obtained by farmers and dairymen that section of the state is feeling quite prosperous. The stronger cement market has also been a favorable factor. The mild weather benefited the farmers by allowing them to pasture their stock to a much greater extent than during the cold and changeable weather of February, 1916. The general outlook is good.

During February a new five-year street lighting contract with the city of Sedro Woolley was filed.

Brockton, Mass., March 5th:

Bank clearings for February, 1917, were \$11,058,722.

Savings bank deposits in February, 1917, were \$14,583,709, against \$13,055,225 last year.

Post office receipts for February, 1917, were \$21,842.

During February, 1917, 21 building permits were issued, valued at \$36,000, against 13 last year, valued at \$30,850.

During February, 1917, 60,824 cases of shoes were shipped from

Brockton, which compares very favorably with January shipments of 62,780 cases, considering that the figures for January cover five weeks, as against four for February.

It is understood that a new business block is to be built on Main street on the property owned by the New Jerusalem Church Society. It is also stated that a new two-storey building is to be erected on Main street for a market.

Canton, Mass., March 1st:

Business is good throughout this locality and the factories are advertising for help. Labor of all kinds is scarce.

Dallas, Tex., March 9th:

Building permits for February, 1917, were valued at \$369,342, against \$216,216 last year.

Real estate transfers for February, 1917, were \$1,870,770, against \$1,836,802 last year.

Post office receipts for February, 1917, were \$122,502, against \$108,472 last year.

General business in Dallas and vicinity continues favorable. The past month has witnessed the taking of heavy spring and summer delivery orders by the local wholesale houses. The fear of international complications has to some extent inspired country merchants with caution, but this seems to have been largely offset by the fear of continued advances in prices. Reports indicate heavy purchases in all lines, the volume of wholesale business being larger than usual. The retail trade also seems to be unusually brisk. The advent of spring, it is hoped, will bring about greater activity in the real estate market and renewed activity in building.

The earnings of both the railway and lighting departments continue to show substantial increases and reflect in a measure the prosperous conditions existing in this community.

El Paso, Tex., March 15th:

Bank clearings for February, 1917, were \$16,808,849, against \$9,827,808 last year.

During February, 1917, 187 building permits were issued, valued at \$468,525, against 152 last year, valued at \$487,149.

Post office receipts for February, 1917, were \$29,842, against \$21,288 last year.

Exports for February, 1917, were \$369,916, against \$275,486 last year.

Imports for February, 1917, were \$245,432, against \$148,557 last year.

General business conditions in and around El Paso have continued exceedingly good.

Everett, Wash., March 13th:

During February, 1917, 24 building permits were issued, valued at \$2,855, against 51 last year, valued at \$14,457.

Post office receipts for February, 1917, were \$6,160, against \$5,748 last year.

There has been no improvement in the car supply for local industries, in fact, the situation seems to be even more acute than it was thirty days ago, as most of the mill men state that they are getting only 20 to 40 per cent of the necessary cars. Local agents of the railroad companies do not offer any encouragement of immediate improvement. The number of orders offered to the local mills is large and prices are good.

Fort Madison, Ia., March 6th:

Bank clearings at Fort Madison for February, 1917, were \$1,188,074, against \$868,319.

Bank clearings at Dallas City for February, 1917, were \$393,417, against \$372,878 last year.

Post office receipts at Dallas City for February, 1917, were \$290, against \$286 last year.

Business conditions at Fort Madison were satisfactory during the month of February, owing to the prevailing high prices of farm products and the resultant prosperity of the farmers and stock breeders in this vicinity. The large volume of freight now being handled by the transcontinental railroads entering Fort Madison and the abnormal traffic to California have created very active conditions at the Santa Fe shops. A large proportion of the population of this city is made up of railroad workers and they are particularly prosperous at this time.

There was a slight improvement in the volume of business done by retail merchants in Dallas City during February. The industries there are more active than they have been during the past two years and business conditions as a whole are improved and very satisfactory. This is the result of the increased prosperity of the farmers.

Fort Worth, Tex., March 3rd:

Bank clearings for February, 1917, were \$41,703,098, against \$33,390,708 last year.

During February, 1917, 63 building permits were issued, valued at \$125,215, against 68 last year, valued at \$119,595.

Post office receipts for February, 1917, were \$38,199, against \$36,663 last year.

The receipts at the Stockyards during February, 1917, ran heavily ahead of last year in almost every particular.

It has been announced that the Waters-Pierce interests will spend a million dollars in North Texas. They contemplate an eight-inch pipe line from the Healdton oil field in Oklahoma to Fort Worth and large extensions and improvements on their Fort Worth refinery.

Manufacturers and jobbers are enjoying the beginning of a very satisfactory spring trade, and it is general opinion that barring unfavorable war developments the coming season will be a very active one.

Grain and elevator business is particularly large at this time. Several elevator companies have increased their capacity recently to meet the growing demands, until the storage capacity of Fort Worth is now 4,035,000 bushels. In addition to the demand for grain for export, the country

demand for foodstuffs of all kinds is almost greater than the supply, in spite of rapidly increasing prices.

Our railway earnings for February, 1917, showed an increase of 15 per cent.

Conditions at Cleburne and in the surrounding territory served by the Tarrant County Traction Company have continued generally satisfactory during the month of February. Railway earnings of the Tarrant County Traction Company showed an increase of 6 per cent over February, 1916.

Galveston, Tex., March 7th:

Bank clearings for February, 1917, were \$17,632,106, against \$16,-022,652 last year.

The volume of business done in February, 1917, was \$96,751,000, against \$97,651,000 last year.

During February, 1917, 107 building permits were issued, valued at \$74,638, against 187 last year, valued at \$151,517.

Post office receipts for February, 1917, were \$14,041, against \$16,374 last year.

The Morgan line awarded contract for the construction of six new steamships, four of them 11,000 ton freighters, and two 10,000-ton passenger and freight ships. These new vessels are in addition to the three new steamships now being built for the line, which will go into service about July 1. The four 11,000-ton freighters are for the New York-Galveston service and the 10,000-ton passenger-freight ships are for the New York-New Orleans service. In addition the company has approved plans for five steel and concrete piers in Galveston, the southern terminus of the line.

During the past month 105,946 bales of cotton were shipped from Galveston, against 262,291 bales last year.

Wheat exports for February, 1917, were 1,113,666 bushels, against 4,545,456 bushels last year.

Total exports from the port of Galveston during February, 1917, were valued at \$16,034,533. While these figures show a decrease as compared with the corresponding month of last year, they are not at all discouraging when the unusual adverse conditions which have prevailed at all ports are taken into consideration. Moreover, February last year was an unusually busy month. However, the total value of exports for the first two months of the present calendar year will show an increase of \$3,963,-328 over the same period in 1916.

Haverhill, Mass., March 19th:

The deposits of the Haverhill Savings Banks on February 28 were \$14,046,801, against \$13,023,714 last year, an increase of 7.85 per cent.

During February, 1917, 3 building permits were issued, valued at \$5,600, against 9 last year, valued at \$22,700.

Houghton, Mich., March 8th:

Post office receipts at Houghton for February, 1917, were \$2,292, against \$2,872 last year; at Hancock they were \$2,020, against \$2,111; at Calumet \$2,993, against \$3,089; at Laurium \$1,020, against \$863; at

Lake Linden \$490, against \$420; at Hubbell \$393, against \$354; totaling \$9,208, against \$9,709 last year.

From present indications and barring unfavorable weather conditions, the month of March will show the largest single month's output of copper ever secured from the mines of this district.

The light snow conditions of this winter have enabled the lumber interests to cut and get out more timber than has been brought to the mills for ten years.

Houston, Tex., March 10th:

Bank clearings for February, 1917, were \$48,625,278, against \$42,511,024 last year.

During February, 1917, 217 building permits were issued, valued at \$156,280, against 217 last year, valued at \$221,906.

Post office receipts for February, 1917, were \$49,686, against \$48,603 last year.

Real estate transfers for February, 1917, were \$731,383, against \$2,010,875 last year.

General business conditions continued good during February. Large business concerns of every class report a normal increase over the previous month.

The receipts of the Houston Electric Company for February, 1917, showed an increase of 10.56 per cent over last year.

The receipts of the Galveston-Houston Electric Railway Company for February, 1917, showed an increase of 3.46 per cent over last year.

Keokuk, Ia., March 6th:

General business conditions remain about the same as a month ago, though retail houses report some improvement over the previous month, as well as over the corresponding period of last year. It is believed that the advent of warmer weather will bring about a marked improvement, as there is a great deal of construction work waiting to be begun as soon as the frost is out of the ground.

Key West, Fla., March 5th:

Post office receipts for February, 1917, were \$2,016, against \$1,921 last year.

Customs receipts for February, 1917, were \$51,724, against \$33,225 last year.

Cigar output for February, 1917, was 5,392,540 cigars, against 3,478,860 last year.

Since our last letter, two of the largest cigar factories were closed down for a week or ten days. Manufacturers said this was due to a sharp decline in orders from the north, which they attributed to the severance of our relations with Germany. The outlook for the immediate future is difficult to forecast.

Our railway receipts for February, 1917, exceeded those of the previous year, and this is true also of the lighting receipts.

Lowell, Mass., March 15th:

Bank clearings for February, 1917, were \$4,151,431, against \$3,730,-391 last year.

During February, 1917, 33 building permits were issued, valued at \$154,825, against 25 last year, valued at \$22,950.

Post office receipts for February, 1917, were \$14,731, against \$15,816 last year.

Business conditions remain very good in Lowell and surrounding territory. Manufacturers are well supplied with orders and no curtailment is expected in the immediate future.

The sale of power current continues very satisfactory. Our company is also securing a large number of new residence lighting customers, the greater percentage being in connection with old houses that are now being wired for electric lights. The sale of electric appliances continues very good indeed.

Paducah, Ky., March 6th:

Bank clearings for February, 1917, were \$4,962,084, against \$3,176,-543 last year.

The increase in bank clearings illustrates the prosperity this city is now having, due almost entirely, it is believed, to the high price now being paid for tobacco. During February, a great deal of tobacco was marketed, the average price being around 10 and 12 cents per pound, which is from 25 to 50 per cent above normal. It is understood that approximately 70 per cent of the crop has been marketed, and although there are some indications that the price for the balance will be somewhat lower, it should still be sufficiently high to net the farmer a good profit.

The American Cigar Company has decided to locate a branch in this city. A suitable building has been secured and the alterations are now under way. It is expected that by April 1 the company will have approximately 100 girls under employment here, which number will probably be increased to 500 if business conditions continue as at present.

Pawtucket, R. I., March 8th:

Banks report an increase of 5 per cent in commercial accounts and an increase of 17 per cent in savings accounts during February, 1917.

During February, 1917, 8 building permits were issued, valued at \$45,900, against 3 last year, valued at \$38,000.

Post office receipts for February, 1917, were \$11,856, against \$12,931 last year.

Manufacturers, merchants and bankers report flourishing conditions in all lines of activity, and the opinion prevails that with the placing of government contracts in connection with the present international crisis, business will almost suffer from over-stimulation. It is conceded that business for March, 1917, will far exceed that of 1916, barring the unforeseen. Orders received and in hand keep the mills very busy. This is particularly true with respect to the mills on fancy textiles, lace, silk and narrow fabrics, and also with respect to the makers of textile machinery, machine shops and foundries generally.

Retail merchants report an unusually good increase for February, 1917, over the corresponding period of 1916, amounting in fact to 15 per cent.

Pensacola, Fla., March 5th:

During February, 1917, 107 building permits were issued, valued at \$15,073, against 106 last year, valued at \$29,419.

Post office receipts for February, 1917, were \$7,193, against \$7,252 last year.

Exports for February, 1917, were \$297,947, against \$1,618,332 last year.

The business of the community as a whole continues to show improvement. Both our railway and our lighting receipts for February, 1917, show increases over 1916.

Port Arthur, Tex., March 17th:

Building permits for February, 1917, were valued at \$37,677, against \$53,760 last year.

Post office receipts for February, 1917, were \$3,448, against \$3,026 last year.

Exports of the Sabine District for February, 1917, were \$3,539,131, against \$4,341,066 last year.

Imports for the Sabine District for February, 1917, were \$105,580, against \$85,156 last year.

Custom house receipts for February, 1917, were \$4,522, against \$4,689 last year.

The general business outlook for the immediate future is very good.

Savannah, Ga., March 8th:

Bank clearings for February, 1917, were \$18,754,316, against \$20,363,857 last year.

During February, 1917, 33 building permits were issued, against 63 last year.

Post office receipts for February, 1917, were \$25,664, against \$24,479 last year.

Cotton receipts for February, 1917, were 14,764 bales, against 84,227 bales last year.

Resin receipts for February, 1917, were 11,571 barrels, against 28,995 barrels last year.

Turpentine receipts for February, 1917, were 956 barrels, against 1,559 barrels last year.

General business is continuing to show some improvement over 1916. There is still a lack of ships for the transportation of cotton and naval stores.

Construction work at the cotton compress is about completed. The sugar refinery at Port Wentworth is nearing completion and ground has been broken and construction is well under way for the pulp mill.

Both our railway and our light and power departments showed increased receipts in February over the corresponding period of 1916, despite the fact that the month was one day shorter this year.

General business conditions of Southeast Georgia continue prosperous. Labor is well employed. Weather conditions for the past six weeks have been bad, however, for market gardening.

Seattle, Wash., March 13th:

Bank clearings for February, 1917, were \$67,889,118, against \$44,425,084 last year.

Building permits for February, 1917, were valued at \$634,625, against \$598,615 last year.

Real estate transfers for February, 1917, were \$871,216, against \$762,834 last year.

Business conditions during February, 1917, were very favorable owing to the enormous expansion of the shipbuilding industry, which has now on the ways and under construction \$62,000,000 worth of ships in local yards. Labor is fully employed.

The flour mills are becoming embarrassed by lack of wheat for milling and rumors are current that this year's crop in the Washington wheat belts has been quietly contracted for in the fields by foreign agents.

Sydney, Nova Scotia, March 8th:

During February, 1917, 4 building permits were issued, valued at \$1,915, against 2 last year, valued at \$1,210.

Customs receipts at Sydney for February, 1917, were \$22,975, against \$31,347 last year.

The output of the Dominion Coal Company for February, 1917, was 299,644 tons, against 362,777 tons last year, and the shipments were 228,394 tons, against 268,583 tons last year.

The scarcity of labor continues to hold down the Dominion Coal Company output, while the increased demands of the Steel Company and the difficulty of securing bottoms reduced the amount available for shipment.

General business was satisfactory during February, especially when it is recalled that this is usually the dullest period of the year for mercantile houses.

The weather during February was especially favorable and is reflected in our tramway earnings. The light and power department continues to secure a considerable amount of new business, with good prospects for the future.

Tacoma, Wash., March 13th:

Bank clearings for the first two months of 1917, were \$21,447,786, against \$17,006,966 last year.

During the first two months of 1917, 256 building permits were issued, valued at \$276,431, against 244 last year valued at \$276,825.

Real estate transfers for the first two months of 1917 were \$513,096, against \$409,525 last year.

Post office receipts for the first two months of 1917 were \$47,334, against \$50,797 last year.

The establishment of a division army post at American Lake, south of Tacoma, is now assured, the Supreme Court having ruled that the

Pierce county bond issue of \$2,000,000 for the purchase of 70,000 acres of prairie land to be donated to the federal government is valid. Condemnation of the land desired will be begun at once.

Tampa, Fla., March 12th:

Bank clearings for February, 1917, were \$4,319,270, against \$4,501,812 last year.

Building permits for February, 1917, were valued at \$42,550, against \$75,385 last year.

Post office receipts for February, 1917, were \$21,242, against \$22,758 last year.

Customs receipts for February, 1917, were \$154,249, against \$139,144 last year.

Internal revenue receipts for February, 1917, were \$82,489, against \$72,930 last year.

The value of water commerce for February, 1917, was \$3,009,655, against \$3,427,293 last year.

Cigar shipments for February, 1917, were 26,876,280 cigars, against 17,680,000 cigars last year.

General business is being favorably affected by the presence of a larger number of tourists than have ever previously visited this city and this condition is expected to last until the middle of April. It is now becoming known that the citrus fruit trees in this section of South Florida escaped serious injury during the recent cold weather. The trees are now putting forth bloom indicative of a good crop next winter. Building trades are inactive, but the cigar industry remains prosperous and is exceeding former records for this season of the year.

Plans have been announced for the erection of a large tourists' hotel on Old Tampa Bay, with attractive surroundings of golf links, game and fish preserves, and all facilities for land and aquatic amusement.

Woonsocket, R. I., March 9th:

During February, 1917, 17 building permits were issued, valued at \$45,335, against 8 last year, valued at \$19,550.

General business conditions continue excellent, although not quite so good as in January. Merchants, however, report conditions much better than the average for February.

The receipts of both our gas department and our electric department for February, 1917, showed substantial increases over the preceding year.



DESMOND FITZGERALD MEDAL

Awarded to Dana M. Wood by the Boston Society of Civil Engineers for the Most Meritorious Paper in 1916

News from the Companies

Boston Office

The frontispiece of this issue of the Journal pictures a flag-raising by the Boston Elevated Railway Company on April 12. The company's offices are at 101 Milk street, Boston, and many members of the Stone & Webster organization were therefore able to observe the event. It was an inspiring sight, and quite typical of the period through which this country is now passing.

Mr. J. W. Hallowell has accepted the chairmanship of the Committee on Supplementary Rations of the New England Belgian Relief Fund.

Mr. and Mrs. Marcy L. Sperry announce the birth of a daughter.

Mr. L. B. Buchanan has been appointed a member of the Public Safety Committee of Massachusetts. He is also chairman of the Public Safety Committee of his city, Woburn, Mass.

Mr. N. H. Daniels has been appointed a member of the Public Safety Committee of the town of Bedford, Mass.

Mr. L. H. Bean of Tacoma was at the Boston office recently.

At the annual meeting of the Boston Society of Civil Engineers on March 21, Mr. Dana M. Wood of the Stone & Webster organization was presented with the Desmond Fitz Gerald medal for the most meritorious paper in 1916. Mr. Wood's paper, entitled "Power Estimates from Stream Flow and Rainfall Data," appeared in the March number of the society's journal, and was discussed at considerable length in the June issue by a number of engineers, among them Mr. E. S. Glines of the drafting division.

Mr. Luther R. Nash is at Beaumont, Tex.

Mr. George C. Crom, Jr., of the Pensacola Electric Company is now in the statistical department of the Boston office.

Mr. H. F. McLean has left the statistical department and re-entered the insurance business.

Mr. Ansel A. Packard of the statistical department has entered the service of the Connecticut Power Company at New London, Conn.

Miss Maude I. Delhommeau has left the organization.

Mr. Charles E. Dole, formerly of the treasurer's office, has been transferred to the Ponce Railway & Light Company.

At the request of Mr. Eliot Wadsworth, Mr. Oakes of the transfer department has gone to Washington to assist temporarily in emergency work of the Red Cross. During his absence Mr. Walsh will act as head of the transfer department.

The Engineering Division has closed a contract with the Union Switch & Signal Company, Pittsburgh, Pa., for the construction of two six-story flat slab construction concrete buildings. The estimated cost of this work is about \$750,000.

The New Bedford Gas & Edison Light Company has authorized the Engineering Division to make another extension to its new power station and install a 15,000 kilowatt turbine and auxiliaries. The estimated cost of this new work is \$656,000.

The Engineering Division has recently been awarded the following contracts:

The Republic Rubber Company—construction of office building at Youngstown, O. Estimated cost, \$44,000.

Carnegie Steel Company—street improvement work in McDonald, O. Estimated cost about \$400,000.

Baton Rouge, La.

It is reported that early construction work will begin on the extensions and improvements which the Yazoo and Mississippi Valley Railroad Company contemplates making in Baton Rouge. Extensive track yards, a round house, shops, coaling station and improvements to the present stations, both in the city and at the Standard Oil Company, are included in the present plans. It is understood that about \$350,000 has been budgeted for the improvements that are to be made. Work on the new coaling station has already been started and ground is being prepared for the new engine barn, which will accommodate twelve locomotives at a time.

The city abattoir, which was built about a year and a half ago, has proven entirely too small to take care of the city's needs; accordingly arrangements have been made for the enlargement of the entire equipment. It is estimated that \$20,000 will be required for the improvements planned and loans have been placed which will make it possible for the construction work to begin in the near future.

The Grand Lodge of the Independent Order of Odd Fellows of Louisiana held its eighty-fourth annual session in Baton Rouge during the month. At the same time other branches of the Odd Fellows and the Rebekah Assembly were in session here. The sessions were attended by a large number of delegates from all over the state and many interesting meetings were held.

The DeVaux Greater Shows, Inc., which has been making its headquarters in Baton Rouge this winter, opened the spring festival here under the auspices of the Baton Rouge Fair Association, with large crowds attending. It is hoped that the Fair Association will raise a large amount of money in this way for this year's fair.

Mr. H. B. Bettinger, of the gas engineering department of Boston, is in Baton Rouge looking over the gas property here.

Mr. I. M. Stover, manager, and Mr. E. P. Williams, assistant treasurer, recently went to New Orleans to attend a special meeting of the directors of the Baton Rouge Electric Company.

Fort Madison, Ia.

The Perfection Tire & Rubber Company is adding to its operating force and increasing its output.

The new Wardway paper mills, which are to be built by Montgomery Ward & Co., will be started about April 1. The new factory buildings of the American Fork & Hoe Company are nearing completion. It is understood that this company will employ, approximately, 250 men. It formerly operated its plant within the prison walls with convict labor.

The Continental Machine & Foundry Company, which discontinued operation in January, has been acquired by new interests and is in the

process of a re-organization, which will put it upon a basis where it can meet the large demand for the refrigerating machine which it manufactures. It will operate a large foundry in connection with its machine shop.

The river was open about the 10th of March, which is somewhat earlier than last year. There is still a good deal of floating ice moving down stream. The river traffic should commence early in April.

Fort Worth, Tex.

Mr. W. E. Tucker, of Messrs. Tyler, Corneau & Eames, made us a short visit February 19.

The new Birney Front-Entrance cars which we are operating on the Summit Avenue Line continue to excite considerable interest. We have had as visitors to observe the operation of these cars during the past month, Mr. F. W. Hild, general manager of the Denver Tramway Company; Mr. B. M. Lathrop, superintendent of the Colorado Springs Interurban Railway Company; and a party consisting of the mayor and two aldermen from Waterloo, Ia., who are planning improvements in the street railway system of their city.

News of the death of Mr. Richard E. Griffiths, which occurred at Beaumont on the 17th of February, was a great shock to the Fort Worth organization and the friends who knew him during his long service here, before his transfer to the Beaumont Companies.

Mr. E. E. Nelson, electrical engineer for this company for the past eleven years, has left us to enter the service of the Adirondack Electric Power Corporation at Utica, N. Y. The night before his departure a banquet was tendered him by the officials and employees of the Northern Texas Traction Company. There were many expressions of good will from those present, and a gold watch and chain were presented to Mr. Nelson as a reminder of the esteem in which he has been held here.

Mr. J. B. Ledlie, who has been Mr. Nelson's assistant for several years, has been appointed electrical engineer in his place.

Mr. J. B. Allen, who has been in the accounting department here for the last three years, has been transferred to the auditing department at the Boston office.

Jacksonville, Fla.

Mr. John G. Woods, of the Stone & Webster Engineering Division, made a business trip to this city recently.

Mr. J. H. Vander Veer, betterment engineer, who is at present stationed with the Tampa Electric Company, paid us a call recently while passing through Jacksonville.

Mr. A. F. Henderson, auditor for the Stone & Webster Management Division, was with us during the latter part of February.

Mr. E. L. Richard, formerly connected with the accounting department of this company, paid us a call recently. Mr. Richard is now in charge of the Tampa agency of the Goodrich Tire Company.

Our company has just placed in commission two automobile trucks. One is rigged with tower for overhead work, while the other is being used for general service.

The New Art Pictures Company has erected a moving picture

studio on the Traction Company's Phoenix Park tract. This moving picture company is using a new process of photography, by means of which scenes are reproduced on the film in natural colors. The first commercial pictures made by this process are now being taken and it is predicted that this new process will revolutionize the moving picture industry.

The railroads entering the city have let contract for the new million-dollar Terminal Station, to be erected at the site of the present Union Station, and work has been begun on the project.

The Second Regiment, National Guard of Florida, returned from the Texas border to the State Camp Grounds near this city during the middle of March. The regiment remained at the State Camp for about a week while being mustered out of Federal service, and then departed for their home cities.

It is rumored that an immense shipbuilding plant is being planned for this city by a large syndicate. Details have not as yet been made public.

Mr. J. H. Hood, assistant construction manager of Stone & Webster Engineering Division, paid us a pleasant visit recently.

Keokuk, Ia.

On March 8, Mr. R. E. Bakenhus, civil engineer, U. S. N., visited Keokuk. Mr. Bakenhus is a member of the official board appointed to determine upon a suitable location for the government armor plate plant. He was shown over the Keokuk power station and was given an opportunity to inspect several possible sites for the armor plate plant. Luncheon was served at the Hotel Iowa, representative citizens of Keokuk, together with Mr. Kellogg and other officials of the Power Company, acting as hosts. Shortly after noon Mr. Bakenhus left for Quincy, Ill., his next point of inspection, a delegation from that city having met him at Keokuk.

During February, a visit was made to Keokuk by freight traffic officials of the Burlington railroad, and an inspection made of the Keokuk power station and the works of the Keokuk Electro-Metals Company, the River Smelting & Refining Company, and other local industries. The object of the trip was to obtain first hand information of industrial conditions, as an aid to a proper solution of such traffic problems as are incidental to the handling of business in this district.

A joint meeting of the High Tension Club and the National Association of Stationary Engineers was held in the Y. M. C. A. auditorium on Tuesday, March 6. Dr. Bransky, oil chemist of the Standard Oil Company, delivered an address on crude oil and its by-products; and Mr. E. Wannamaker, electrical engineer of the Chicago, Rock Island and Pacific Railroad, spoke with reference to "Internal Combustion Engines." Stereopticon slides were used to advantage by both speakers. On Wednesday, March 21, the club held its regular meeting in the Y. W. C. A. auditorium. The program for the evening was an illustrated lecture on "Forestry of the United States" by Mr. R. H. Bolster, hydraulic engineer, of the Mississippi River Power Company.

Mississippi River Power Company

The North Missouri Light & Power Company operating properties in the four towns of New London, Perry, Center and Frankford, Mo., and

supplied with Keokuk power by a 33,000-volt connection from the Ilasco substation, was recently purchased by the Illinois Traction Company, known as the McKinley System, this transfer in ownership taking place on February 21.

The totalizing, indicating and curve drawing wattmeter designed and built for the Keokuk power station has been recently received and installed. This instrument has a present scale range extending from zero to 125,000 kilowatts. Thirty individual meter elements are provided, of which seventeen are now connected and in service. The torque exerted by the individual elements is combined in its effect upon six aluminum discs, which are keyed to a common vertical rotating shaft and turn through an angular displacement proportional to the total power being generated in the station. Motion is thus transmitted to the recording pen arm of the meter. A timing attachment connected to the master clock circuit moves the record paper ahead each minute. The meter is approximately four feet in height and two feet in diameter and is located in the center of the system operator's switchboard. Records from this instrument are expected to prove of much value as operating data.

Construction of a second 11,000-volt transmission circuit to the plant of the Keokuk Electro-Metals Company is now under way, all poles having been received and distributed and a number already set in place.

Material has been ordered for the transmission line to be built from Keokuk to Montrose, Ia. This line will be approximately eleven miles in length and will be operated at 11,000 volts, supplying a substation of the Keokuk Electric Company in Montrose.

Mr. Kellogg has been away considerably during the past month, having visited the various properties in the Middle West District, in addition to appearing before the Rivers and Harbors Committee of Congress, in connection with the hearing held at Washington on February 14 and 15 with reference to impounding water behind the Keokuk dam.

Keokuk Electric Company

The Car Men's Club held its regular monthly meeting Saturday night, March 10. After a generous "feed" the members listened to a very interesting talk by Mr. J. L. Rodgers, superintendent of the River Smelting & Refining Company. Mr. Rodgers is a graduate of Annapolis and has spent eight years in the navy. The subject of his talk was "The Training of Men for the Navy, both at Annapolis and other Training Schools, and the Work of Officers and Enlisted Men in the Navy after Graduation from these Schools."

Mr. J. P. Ingle, manager, has just returned from a short business trip to Des Moines, Ia.

Key West, Fla.

Mr. R. C. Shepard, assistant treasurer of this company, was transferred to the Boston office the middle of February.

Mr. Arnold Swain, associated with The Key West Electric Company for a number of years in various capacities, has been appointed assistant treasurer.

Mr. J. E. Murray assumed the duties of chief clerk, accounting department, made vacant by Mr. Swain's promotion.

Mr. John W. Kelly, of the Boston office, succeeded Mr. Murray as storekeeper.

Five of the fastest boats in their class in the world entered the Miami-Key West race, which took place on March 3, 1917. The race started from the Royal Palm dock in Miami and finished off the Florida East Coast docks here. The "Shadow III," owned by Carl G. Fisher, Esq., of Indianapolis and Miami, arrived at 3:24 P.M., and the "Raven III," owned by Commodore Charles W. Kotcher of Detroit, came in at 3:29 P.M. The time made was sixteen minutes under the record, the "Shadow III" making the trip in six hours and twenty-four minutes, and the "Raven III" in six hours and twenty-nine minutes. The boats were somewhat retarded by very heavy weather. The racers were met by a delegation and escorted to the Athletic Club, where a reception was tendered them, and Mr. Fisher was presented with a handsome cup given by the city of Key West.

Mr. Jiro Komiya, electrical engineer of Imperial Government Railways, Tokyo, Japan, was an interesting visitor during the past month. Mr. Komiya represents the Imperial Government of Japan and is making a tour of the United States, studying the railway situation of this country. He was particularly interested in the maintenance and up-keep problems of the Key West Extension.

Henry Ford, Esq., and party were among the prominent visitors to Key West in February. Mr. Ford and party remained here several days aboard his yacht.

Cuban Secretary of State Pablo Desvernine and party were arrivals on the "Governor Cobb" on the 13th of March from Havana en route to Washington, where they go to confer with President Wilson and Secretary of State Lansing regarding conditions of Cuba. While here they were entertained by Cuban Consul J. M. Garcia Cuervo and Chancellor of the Cuban Consulate Domingo Milord.

James W. Gerard, former American Ambassador to Germany, and his party arrived on the 12th of March en route to Washington. Quite a number of Key Westers met the boat and cheered the ambassador quite heartily.

Lowell, Mass.

During the month Mr. W. E. Mountain, for the past year collector for the accounting department, was transferred to the commercial department of this company to fill the position of salesman. As a result of this change, Mr. Caleb F. Rogers of Dartmouth '15 was assigned the position of collector.

On Friday, March 2, 1917, the largest generator of the Bay State Street Railway Company became disabled. Arrangements were immediately made to purchase power from The Lowell Electric Light Corporation, and connections for that purpose were completed Saturday morning, March 3. As repairs to the generator have not yet been completed, the railway company is still using a considerable amount of current supplied by this corporation.

On the evening of the closing match of the L. E. L. Bowling League, held Monday, March 5, at Kittredge's Alleys, the entire top floor, including all the alleys and pool tables, was reserved for the employees of this com-

pany. Light refreshments were served during the evening. Four teams competed for the prizes (Distribution, Steam and Electrical Departments and Office) the distribution department winning the first prize.

On Friday evening, March 9, the young ladies from all departments were the guests of the company at a most enjoyable dinner at the Vesper Country Club, Mrs. J. A. Hunnewell acting as hostess.

On Wednesday afternoon, March 21, our manager gave an illustrated lecture on ornamental street lighting before a class of students of the Graduate School of Business Administration of Harvard University. Later in the week he kindly consented to repeat the lecture for the benefit of all the employees of the company.

Pensacola, Fla.

Mr. T. J. Hanlon, Jr., has been re-elected president of the Escambia County Fair Association.

The Annual Mardi Gras celebration this year was held February 19 and 20, and was a success in every way. The railroads report that over seven thousand people came in during the two days. A great attraction to visitors is the Aeronautic Station and many were disappointed when they found that it was closed to visitors.

An industry will shortly be established in Pensacola to manufacture flower food from fish. The concern is capitalized at \$25,000. It will commence operation within the next few months.

The Gulf, Florida & Alabama Railroad has been re-organized, having been sold within the past few weeks. It is stated that the buyers are backed by sufficient capital and will commence active work soon.

A crew of appliance salesmen from the Westinghouse Electric and Manufacturing Company are engaged in a sales campaign of heating appliances in Pensacola. The crew consists of a manager and nine salesmen and the campaign is made without cost to the Electric Company. It is expected that about seventy-five kilowatts can be added to our lines as a result of their efforts.

Seattle, Wash.

Toward midnight on February 26, part of the south trestle approach to the steel viaduct over Dearborn street at Twelfth avenue south collapsed, making a gap 150 feet in the timber superstructure and absolutely closing all traffic over this route to the Beacon Hill district.

For the past year the Dearborn street bridge has been a matter of concern both to the engineering and utilities departments of the city and to the engineering and operating departments of the Puget Sound Traction, Light & Power Company. Watchmen have been stationed on the bridge for the last two months with instructions to stop any vehicular traffic upon the slightest intimation that the conditions prevailing in early January were aggravated by the impending earth slide. On February 22 Superintendent Case of the street department of the city notified this company that all vehicular traffic over the bridge was closed, and the Puget Sound Traction, Light & Power Company notified the public through its space in the daily papers that street car service would extend to the break on either side and that emergency transfers would be issued.

The city is now engaged in clearing the earth slide and by condemnation proceedings attempting to acquire certain real estate adjacent to the slide for the purpose of protecting such repairs as may be made to the bridge for the restoration of general traffic. It is more than likely that the present conditions will obtain until midsummer at least, much of the steel structure having to be replaced. The city council has voted appropriations to cover immediate work.

The annual dance given by the company for its employees occurred on the night of February 12, three thousand persons being present. The occasion also marked the re-opening of the Hippodrome in a new dressing of electrical and mural decorations.

The work of remodeling the Jefferson Street substation is well under way. The transformer capacity of the 50,000 to 13,000 volt banks is being increased to the extent of 20,000 k. w.

The Seattle Construction & Dry Dock Company has increased the size of its plant and its demand for power until it became necessary to increase our meter capacity. The 13,000 volt service was replaced by 2,200 volt direct from Massachusetts street substation, releasing two 1,000 k. w. transformers and relieving the station 13,000 volt bank.

The Latona lift bridge across the Government canal is nearing completion. Cars are now operating over the new span, and when the concrete counterweights have set sufficiently the cables will be attached. Before the cars were sent across the span a test was made by running a flat car loaded with 100,000 pounds to the center of the span and noting the deflection. It amounted to 19-32 of an inch.

Messrs. Philip, Argersinger, Powell and Clark from the Boston offices are occupying offices adjacent to the engineering department, where they are conducting investigations of present water power conditions and steam plant requirements, with respect to possible future needs. It is expected that "the Boston party" will be here a couple of months.

G. A. Richardson, general superintendent of the railway department and A. D. Campbell, superintendent of rolling stock and shops, will leave March 20 to attend a conference on light weight cars to be held at Fort Worth, Tex.

John Harisberger, general superintendent of the light and power department, has received word from the War Department to the effect that he has been appointed to a captaincy in the Reserve Army Corps of Electrical Engineers. Edgar R. Perry, commercial engineer of the sales department, has been appointed a lieutenant in the same branch of the service.

Tacoma, Wash.

Two thousand civilian soldiers for the business men's encampment at American Lake this summer is the mark set by the boosters for the project. Last year but 124 attended, but it is believed that the international situation existing this year will greatly increase the total. The date of the camps has not yet been announced.

Tampa, Fla.

Two of the William Fox Film Corporation Companies, with Virginia

Pearson and Valeska Surratt as stars, have been in Tampa for several weeks. The grounds of the Tampa Bay Hotel furnished some locations for the various scenes, and the park and river banks at Sulphur Springs were used for Valeska Surratt's picture, taken from Rider Haggard's novel "She."

The new Tampa Ship Building & Engineering Company has launched one steel vessel, and during the summer months is expected to lay the keels of two steel freighters of 3500 tons each. These are to be 274 feet in length and will be the largest steel steamers ever built south of Newport News.

The Tampa Board of Trade has secured the services of an aviator, who will make a large number of flights in his hydro-aeroplane during the summer. The data concerning flying conditions will be used in an attempt to have a government aviation station established here.

The small motor business is particularly good at present and the electric sign business continues to be brisk. Signs have been ordered for the Hodge & Sherman Furniture Company, the Hixon Drug Store and the Hillsboro Hotel.

Six of our fifteen bench open cars are being reconstructed into 48-seat closed cars and the first one is practically completed. The new cars will be of the near-side, prepayment type and the conductor's position will be directly behind the motorman. The folding doors and steps will be operated from the motorman's brake valve.

Work has been started on the installation of a new 7500 kilowatt turbine at the West Jackson street station.

On a recent trip to New York City, Mr. J. H. VanderVeer, company engineer, inspected the Rooke system of fare collection, which is being tried out extensively in Brooklyn.

Mr. Powell of the Engineering Division, paid us a short visit in February.

Woonsocket, R. I.

The annual bowling banquet was held at the club rooms on March 22, P. J. Shunney, president of the Employees' Club, acted as toastmaster, and appropriate speeches were made by the captains of the eight teams participating in the league, together with the star bowlers. The members of the winning team sat at the toastmaster's table, while the members of the team landing at the bottom of the league, served the dinner.

A local Kiwanis Club has recently been organized in Woonsocket. Gardner Rogers, manager, C. B. Healy, accountant, and H. J. Pettengill, Jr., commercial manager, are members of our company who have joined the club.

C. B. Healy, accountant, after two months' absence from the office, has again taken up his duties. Mr. Healy underwent a very successful operation for kidney trouble in January.

Mr. H. R. Sharpless, assistant chief engineer, left Woonsocket on March 27 for Baton Rouge, La., where he has been appointed chief engineer.

Mr. Walter C. Shields has been transferred from Tampa, Fla., to Woonsocket to succeed Mr. Sharpless.

On March 13 at the Employees' Club a very interesting illustrated

lecture was given on the "National Glacier Park." This lecture is one of the numerous lectures which the National Electric Light Association has available for use of company sections.

Mr. Joseph Pratt, for a number of years meter foreman of this company, and recently promoted to the position of superintendent of distribution, left the employ of our company on March 24, to become traveling salesman with the Boss Electric Supply Company, Providence, R. I. Mr. Pratt took with him, as a token of good fellowship, a handsome Hamilton watch, chain and charm, which were given him by his fellow employees.

Mr. Nelson E. Smith has been appointed superintendent of distribution to succeed Mr. Pratt.

Three 2,000 kilowatt transformers have recently been connected at the Woonsocket substation of the Rhode Island Power Transmission Company, to reduce the voltage from 66,000 to 13,000, which is our standard high voltage. These transformers replace three, which were 750 kilowatts in size, installed temporarily, until the larger ones could be obtained.

Mr. H. J. Pettengill, Jr., one of our enthusiastic golfers, has been appointed chairman of the House Committee at the Winnesuket Country Club for the coming season.

COUPONS AND DIVIDENDS DUE

	Per Cent.
Apr. 1, Baton Rouge Electric Company (Coupon Notes) 6s, 1918.....	3
Apr. 1, Beaumont Traction Company 5s, 1943.....	2½
Apr. 1, Blue Hill Street Railway Company, The, 5s, 1923.....	2½
Apr. 1, Columbus Electric Company 5s, 1933.....	2½
Apr. 1, Columbus Power Company, The, 5s, 1936.....	2½
Apr. 1, Columbus Railroad Company 5s, 1937.....	2½
Apr. 1, Connecticut Power Company, The, 5s, 1963...	2½
Apr. 1, Dallas Electric Corporation 5s, 1922.....	2½
Apr. 1, Electric Light and Power Company of Abington and Rockland, The, 5s, 1919.....	2½
Apr. 1, Everett Railway and Electric Company 5s, 1921	2½
Apr. 1, Everett Railway, Light and Water Company 5s, 1925.....	2½
Apr. 1, Galveston-Houston Electric Railway Company 5s, 1954.....	2½
Apr. 1, Haverhill Gas Light Company, Capital Stock, (\$50 par).....	\$1.12½
Apr. 1, Houghton County Traction Company, Pre- ferred Stock, 6 per cent.....	3
Apr. 1, Nevada Power, Light and Water Company 6s, 1932.....	3
Apr. 1, New London Gas and Electric Company, The, 5s, 1927.....	2½
Apr. 1, New London Gas and Electric Company, The, 5s, 1929.....	2½
Apr. 1, Savannah Power Company (Coupon Notes) 6s, 1917.....	3
Apr. 1, Savannah, Thunderbolt and Isle of Hope Rail- way, The, 4s, 1947.....	1
Apr. 1, Sierra Pacific Electric Company (Coupon Notes) 5s, 1919.....	2½
Apr. 1, Tacoma Railway and Power Company 5s, 1929	2½
Apr. 1, Woonsocket Electric Machine and Power Com- pany 4½s, 1943.....	2¼

*Payable quarterly.

		Per Cent.
Apr. 15,	*Puget Sound Traction, Light & Power Company, Preferred Stock, 3 per cent.	\$.75
May 1,	Cape Breton Electric Company, Limited, Preferred Stock, 6 per cent.	3
May 1,	Cape Breton Electric Company, Limited, Common Stock.	1½
May 1,	Eastern Texas Electric Company 5s, 1942.	2½
May 1,	*Edison Electric Illuminating Company of Brockton, Capital Stock.	2
May 1,	*Fall River Gas Works Company, Capital Stock.	3
May 1,	Galveston Electric Company 5s, 1940.	2½
May 1,	Houghton County Electric Light Company, Preferred Stock, 6 per cent.	3
May 1,	Houghton County Electric Light Company, Common Stock.	2½
May 1,	Jacksonville Electric Company 5s, 1927.	2½
May 1,	*Lowell Electric Light Corporation, The, Capital Stock.	2½
May 1,	Mississippi River Power Company (Debentures) 6s, 1919.	3
May 1,	Paducah Traction and Light Company 5s, 1935.	2½
May 1,	Pawtucket Gas Company of New Jersey, The, 4s, 1932.	2
May 1,	Ponce Electric Company 6s, 1927.	3
May 1,	*Public Service Investment Company, Preferred Stock, 6 per cent.	1½
May 1,	Railway & Light Securities Company 5s, First series, 1935; Second and Third series, 1939; Fourth series, 1942; Fifth series, 1944; Sixth series, 1946.	2½
May 1,	Seattle Railway Company, The, 5s, 1921.	2½
May 1,	*Sierra Pacific Electric Company, Preferred Stock, 6 per cent.	1½
May 1,	Whatcom County Railway & Light Company 5s, 1935.	2½
May 15,	*Keokuk Electric Company, Preferred Stock, 6 per cent.	1½
May 15,	*Tampa Electric Company, Capital Stock.	2½

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

MARCH 31, 1917

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	100	No	Pref	8%	168
Baton Rouge Elec. Co. { Bond, 1939 Notes, April, 1918	5% 6%	93½ 100	6%	91		.....
Blackstone Valley Gas & Elec. Co.	5%	102½	*6%	107	8%	160
Blue Hill St. Ry. Co., The	5%	93	No	Pref		.....
Brockton & Plymouth St. Ry. Co.	4½%	91				
Cape Breton Elec. Co., Ltd.	5%	93	6%	85	3%	51
Central Mississippi Valley Electric Properties	No	Bonds	*6%	75		12 N
Columbus Elec. Co. { Bonds, 1933 Notes, July, 1917	5% 6%	90 100½	6%	85		35
Columbus Power Co., The	5%	94		.....		.....
Connecticut Power Co., The	5%	98	*6%	96		100
Dallas Elec. Co. { Notes, Jan., 1921 Notes, June, 1917	6% 5%	101 100				
Dallas Electric Corp. Bonds, 1922	5%	99½		.....		.....
Eastern Texas Elec. Co. { Bonds, 1942 Notes, Dec., 1918	5% 6%	92½ 101	*6%	90	5%	62½
Edison Elec. Ilg. Co. of Brockton { Bonds, 1930 Notes, March, 1921	5% 5%	100 100	No	Pref	8%	165
El Paso Elec. Co.	5%	99	6%	100	10%	112
Fall River Gas Works Co.	No	Bonds	No	Pref	12%	240
Galveston Elec. Co.	5%	95		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	81 ^B / _L		35 ^B / _L
Galveston-Houston Elec. Ry. Co.	5%	95	No	Pref		.....
Haverhill Gas Light Co. (Stock par value \$50)	No	Bonds	No	Pref	9%	97½
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	96	6%	23	5%	17
Houghton County Traction Co.	5%	93	*6%	85½		50
Houghton County St. Ry. Co., The	5%	100	No	Pref	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	100 ^B _L		.....		.....
Jacksonville Elec. Co.	5%	96	No	Pref	No	Com
Jacksonville Traction Co.	{ Bonds, 1931 Notes, March, 1917	5% 88 6% 98	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	95		.....
Key West Elec. Co., The	5%	72½		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	222
Mississippi River Power Co.	5%	78 ^A _B		40 ^A _B		10 ^A _B
Northern Texas Elec. Co.	5%	95	6%	85 ^B _L	4%	60
Northern Texas Traction Co.	5%	101½	No	Pref		.....
Pacific Coast Power Co.	5%	98	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	75 ^L		15 ^L		5 ^L
Pensacola Elec. Co.	{ Bonds, 1931 Notes, Jan., 1919	5% 90 6% 99		78		11
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	86		40
Puget Sound Elec. Ry.	5%	85 ^B		.....		.....
Puget Sound Power Co.	5%	96	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	{ Bonds, 1919	6% 100	*6%	75		30
Railway & Light Sec. Co.	{ First Series, 1935 Second Series, 1939 Third Series, 1939 Fourth Series, 1942 Fifth Series, 1944 Sixth Series, 1946	5% 100 5% 100 5% 100 5% 100 5% 100 5% 100	*6%	98	6%	95
Savannah Elec. Co.	5%	70 ^B _L		20		5
Seattle Elec. Co., The	{ 1st Mortgage, 1930 Cons. & Ref., 1929 Seattle-Everett, 1939 The Seattle Ry., 1921	5% 102 ^B _L 5% 97½ ^L 5% 93 5% 101½	No	Pref	No	Com
Sierra Pacific Elec. Co.	{ Notes, April, 1919	5% 99½	*6%	75		6
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	101	No	Pref	10%	129
Whatcom County Ry. & Lt. Co.	5%	93	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified.

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange. L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights.

LIBRARY NOTES

We have on exhibit the *New International Encyclopedia*, bound in buckram, and believe that many in the office would be interested to look over the various volumes, to inspect it from the various points of view. The volume entitled "Course of Reading and Study" is of particular interest.

"*Mechanical Equipment of Buildings*," Volume I, by Harding and Willard, has the subtitle "A Reference Book for Engineers and Architects." "This book is a new departure in the literature on the mechanical equipment of buildings. It proposes to deal not only with heating and ventilation of buildings, which are considered in this first volume, but also (in subsequent volumes) with power plants, elevators, lighting systems, refrigeration plants, sprinkler systems, vacuum cleaning, and plumbing."

The General Electric Company has recently started "The Boston District News Letter," containing items which it believes will be of interest to its customers and agents. In No. 2, for November, 1916, note the following item, which is of general interest: "Gas vs. Electricity:—There is an impression that the entrance of electricity into the lighting field has had and will continue to have a tendency to drive out gas. This is not true. The competition of electricity for heating and lighting purposes has stimulated the gas industry in four directions. First, to provide better gas; second, to find increased uses for gas, particularly where electricity would not be practicable. Third, to lower the price of gas; and fourth, to promote higher efficiency in the management of gas companies. The result is a very much wider use of gas, a realization that gas and electricity are not necessarily competitors, and an affiliation in many cases of these companies to promote the interests of each."

"*The World's Greatest Battle*" is the title of a pamphlet by Rudolph J. Bodmer, and the battle is the war against accidents. This pamphlet is copiously illustrated, with awful pictures of the results of carelessness, and is full of precautionary suggestions.

"*The Flow of Water in Wood-stave Pipe*" is the title of Bulletin No. 376 of the United States Department of Agriculture. "It is based on field tests made on pipes in commercial operation. New formulas are developed that more accurately

fit all known data than any others now used. This publication is offered for use of engineers designing and measuring wood-stave pipes for irrigation, power, municipal, mining, or other purposes and for courts and attorneys at law interested in cases involving the carrying capacities of wood-stave pipes."

The Federal Trade Commission has issued a report on Co-operation in Latin American Trade, in two parts, the second of which deals with exhibits. One of the most interesting chapters deals with competitive conditions in South-American trade.

Handbook of Architects and Builders, 19th edition, is a publication of the Illinois Society of Architects. One of its most interesting features is the building ordinance of the City of Chicago.

"*America and the New Epoch*," by Charles P. Steinmetz, should be widely read. The author is too well known to need introduction, but he makes the following interesting statement about himself: "For several years I was employed by a small manufacturer; then for nearly a quarter of a century with a huge manufacturing corporation, and helped make it what it is today. Thus I have seen the working of small individualistic production—where every cent increase of wages appears so much out of the pockets of the owner—and of corporate production, and have realized, from my acquaintance with the inside workings of numerous large corporations, that the industrial corporation is not the greedy monster of popular misconception, bent only on exploitation, and have most decidedly come to the conclusion that, even as crude and undeveloped as the industrial corporation of today still is in its social activities, if I were an unknown and unimportant employee I would far rather take my chances with the impersonal, huge industrial corporation than with the most well-meaning individual employer."

"*Waterworks Handbook*," compiled by Alfred Douglas Flinn, Robert Spurr Weston, and Clinton Lathrop Bogert, gives "a usable compilation of information old and new for the waterworks engineer and superintendent, the designer, constructor, operator, and inspector." We have thought well enough of this book to make about fifty cards for it, so that in our catalogue it will be referred to under many different headings.

The advance chapters of "Mineral Resources for 1915" dealing with "*Clay-working Industries and Building Operations*

in the Larger Cities," will be of particular interest to us on account of the building statistics of the leading cities of the United States in 1915, contained in the last ten pages of the pamphlet.

The World Almanac, 1917, is larger than last year, partly on account of advertising, and more especially on account of having fifty pages extra of text, the total number of pages being 1126, against 1060 for 1916.

"Principles of Alternating Current Machinery," by Ralph R. Lawrence, "deals with principles underlying the construction and operation of alternating current machinery. It is in no sense a book on designing . . . No attempt has been made to treat of designs of alternating current machines, only the most important being considered. Certain types have been developed in considerable detail, where such development seemed to bring out important principles."

"The Present Labor Situation" is the title of the January issue of the *Annals of the American Academy of Political and Social Science*. Some of the chapter headings are of suggestive interest to us, viz.: The problem of railway trainmen's wages; Issues in the street railway strike in New York City; The present trend of real wages; Better living conditions for employees and their relation to stability in employment; Maximum vs. minimum hour legislation; The extent of trade unionism; Evolution of legal remedies as a substitute for violence and strikes; Compulsory arbitration or investigation before strikes or lockouts; Government arbitration and mediation. By consulting the copious index other headings may be found, such as Retail prices of food, in which there is a short table entitled "Purchasing Power of Rates of Wages per Week, Measured by Retail Prices of Food"—fluctuating from 1907, taken as 100, to 1915, for which the relative figure is 90.

"The Purposes and Ideals of the Mexican Revolution" is the title of a 32-page pamphlet, which came as a supplement to the January *Annals*. It consists of addresses delivered before the Academy by four Mexican members of the American and Mexican Joint Commission. President Rowe, of the Academy, says in his foreword: "The American public has never had an opportunity to form a judgment of the purposes of the Mexican Revolution. It has seemed important to the officers of the Academy that these purposes should be presented by the men who have taken not only a leading part in the revolutionary

movement but who are now actively engaged in an endeavor to work out these purposes in concrete and practical form."

"*Geographic Tables and Formulas*" is the title of Bulletin 650 of the United States Geological Survey, which is the 4th edition, 1916. It has forty tables, among them the following: For interconversion of feet and decimals of a mile; Five-place logarithms of natural numbers; For converting metric into United States measures; For converting United States measures into metric; For interconversion of miles and logarithms of meters. It also has a list of convenient equivalents. There is no preface, and therefore nothing said to indicate what changes have been made over previous editions. Obtainable of the Superintendent of Documents, Washington, D. C., at 25 cents.

"*Data on Municipal Plant Operation in Oklahoma*" is "a report on operation and financial condition of most of the larger municipal water and light plants in Oklahoma for the fiscal year July 1, 1913, to June 30, 1914. It is by Harold V. Bozell, E. E., published by The Municipal Ownership Publishing Company, New York. It is a systematic treatment giving the names of twenty-six different towns, their population, local government, industries, equipment of the plants, operating conditions, financial statement and history of the plants, the aim being to show the actual cost of running and the actual receipts.

What if the various doctors' theses, the Ph.D.'s throughout the country, were made available through a bibliography! The fact is that a large number of them are, and we have from the Library of Congress a 160-page book, entitled, "*A List of American Doctoral Dissertations Printed in 1915*," compiled according to the plan adopted for the list of 1912. Three hundred and nine of these are listed according to author, and then in classified order. Most of the titles would hardly mean much to us, though the following are likely to be of interest: 73. The Canadian iron and steel industry; a study in the economic history of a protected industry. 109. Hydro-electric treatment of copper ores. 139. Railway problems in *China*. 183. The corona in air at continuous potentials and pressures lower than atmospheric . . . Lancaster, Pa. 249. The underground and surface water supplies of Madison.

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil Engineering

- 189 Earth pressure, retaining walls and bins. W. Cain. New York, 1916. 287p, 6x9. *077.C123
- 190 Reinforced concrete design tables . . . M. E. Thomas and C. E. Nichols. 1st ed. New York [c1917]. 208p, 4x7. *0772.T365
- 191 A treatise on concrete, plain and reinforced . . . F. W. Taylor and S. E. Thompson. 3d ed. New York, 1916. 885p, 6x9, illus. *0772.T21.1916
- 192 The diving rod . . . U. S. Geological Survey. Water Supply Paper 416. Wash., 1917. 59p, 6x9, illus. W S I 416
- 193 Sixty-second annual report of Board of Water Commissioners of City of Hartford, Conn. . . . year ending 3/1/16. 145p, 6x9, illus, maps. *1621.W291.1916
- 194 Surface water supply of the United States, 1914. Pt. XII. North Pacific drainage basins . . . U. S. Geological Survey. Water Supply Paper 392.
Same, 1915. Pt. II. South Atlantic Basin . . . Water Supply Paper 402.
Same, 1915. Pt. VII. Lower Mississippi River Basin . . . Water Supply Paper 407.
- 195 Ground water for irrigation in the Morgan Hill Area, California. W. O. Clark . . . U. S. Geological Survey. Water Supply Paper 400-E. Wash., 1917. 108p, 6x9, maps. W S I 400-E
- 196 Report of hydrometric surveys (stream measurements) for calendar year 1915. Department of Interior of Canada . . . Ottawa, 1917. 590p, 6½x10, illus, map. *7200.St8.1915
- 197 Annual report of Superintendent of U. S. Coast and Geodetic Survey . . . fiscal year ended 6/30/16. Wash., 1916. 164p, 6x9, illus, maps. *6897.1916

(20) Electrical Engineering

- 198 The nature of matter and electricity. D. F. Comstock and L. T. Troland. New York, 1917. 203p, 5½x8. *071.C739
- 199 "An hour of light for an hour of day." The plan for saving an hour of daylight: report of Special Committee on Daylight Saving of Boston Chamber of Commerce. Supplement to "Current Affairs," March 19, 1917. 30p, 6x9. *1461.C35.0711
- 200 Hall of Records power plant. Report and discussion of physical test and costs of operation and maintenance. Test conducted for full year, 1913, under auspices of a Board of Engineers . . . New York, 1916. 673p, 7x10½. *1791.H14.053
- 201 Annual report of Mississippi River Power Co., Keokuk, Ia. . . . 1916. 12p, 8x10½, map. *4292.0532.1916

(40) Mining Engineering

- 202 Coal in 1915. Pt. A: Production. Pt. B: Distribution and consumption. . . . U. S. Geological Survey . . . Wash., 1916. 6x9, maps. *6874.075c1915.Pts. A & B
- 203 Analyses of coals purchased by the government during fiscal years 1908-1915 . . . U. S. Bureau of Mines, Bulletin 119. Wash., 1916. 118p, 6x9. *6876.B119
- 204 The primary volatile products of the carbonization of coal. [A sequel to Bulletin 1, the volatile matter of coal] . . . U. S. Bureau of Mines. Technical Paper 140. Wash., 1916. 59p, 6x9, illus. *6876.Tp140

- 205 A specific gravity balance for gases . . . U. S. Bureau of Standards. Technologic Paper No. 89. Wash., 1917. 20p, 7x10. *6898.Tp89
- 206 The Garrison and Philipsburg phosphate fields, Mont. J. T. Pardee . . . U. S. Geological Survey. Bulletin 640-K. Wash., 1917. (34p), 6x9, maps. *6874.B640-K

(50) Railways

- 207 Report on electricity and report on electrolysis. American Railway Engineering Association. Bulletin No. 191. 11/16. (180p), 6x9. *6931.B191
- 208 Proceedings of American Electric Railway Association, 1916. 369p, 6x9, illus. *6940.1916

(73) Sociology

- 209 Vocational education survey of Minneapolis, Minn. . . . U. S. Bureau Labor Statistics . . . Bulletin No. 199. Wash., 1917. 592p, 6x9. *6899.B199
- 210 Community action through surveys. S. M. Harrison. New York, 1916. 29p, 6x9. *029.H248
- 211 Profit sharing in the U. S. B. Emmet . . . U. S. Bureau Labor Statistics . . . Bulletin No. 208. Wash., 1917. 188p, 6x9. *6899.B208
- 212 The high cost of living and high cost of government. Address. . . F. G. R. Gordon . . . Jan. 4, 1917. 14p, 6x9. *02.G654
- 213 Modern insurance problems. In Annals American Academy of Political and Social Science, March, 1917. 347p, 6½x10. *055.Am 35

(74) Financial

- 214 National Association of Comptrollers and Accounting Officers: proceedings of the tenth annual convention . . . 1915, also eleventh annual convention . . . 1916. 141p, 6x9. *6902.1915-16
- 215 Rand McNally's Bankers' Directory, Jan., 1917. Chicago [c1917]. 2035p, 8x11, maps. *025.R15-1/17
- 216 The Bankers Register . . . Jan., 1917. The Credit Co. Chicago [c1917]. 1830p, 9x12, maps. *025.C86-1/17
- 217 Moody's Manual: complete list of securities maturing Jan. 1, 1917-Dec. 31, 1918. Vol. III. Moody Manual Co. New York [c1917]. 275p, 4x7. *025.M77c
- 218 Second annual convention of corporations operating the Morris plan of industrial loans and investments, 10/4-6/16. New York City. 92p, 9½x11. *025.In2.1916
- 219 Financial statement of the U. S. Government . . . Dec. 31, 1916. U. S. Treasury Department. 1p, 12x19. *6820.025
- 220 Values of foreign coins. U. S. Treasury Department. Department Circular No. 1. 1p, 8x10½. *6820.Dc1
- 221 Schedule of rates. The Edison Electric Illuminating Co. of Boston. Jan. 1, 1917. 15p, 4½x9. *1461.Ed4.023

(75) Annual Reports

- 222 Annual report of Commissioner of Internal Revenue, fiscal year ended 6/30/16, with statistical tables. Wash., 1916. 254p, 6x9. *6825.1916
- 223 Biennial report of Forestry Commission, State of New Hampshire, for years 1915-1916. Manchester, 1916. 177p, 6x9, illus, map. *1200.F762.1915-16

(76) Legal

- 224 Business corporations under the laws of Delaware. 3d edition revised to include 1911 legislative changes . . . Jersey City [c1911]. 22p, 5x7½. *2100.0316b

- 225 Labor laws and their administration in Pacific States. H. S. Hanna . . . Bureau of Labor Statistics. Bulletin No. 211. Wash., 1917. 150p, 6x9. *6899.B211
- 226 Workmen's Compensation Act of State of Washington . . . 1911, as amended . . . 1913, 1915 . . . Olympia, 1915. 32p, 6x9. *6100.0317
- 227 Requirements of Massachusetts income tax law. Issued by Tax Commissioner, 11/16. Bulletin No. 1. 39p, 6x9. *1400.T19.Bull. No. 1
- 228 Speech of Hon. J. W. Weeks of Massachusetts in Senate of United States, 2/22/17, regarding the revenue bill. Wash., 1917. 32p, 6x9. *6800.W41.0318
- 229 Act providing for a State nautical school and for the government and maintenance thereof, approved 3/22/17. Wash. (State) Legislature. (45p), 6x9. *6100.0319
- 230 Water power development bill: comparative print showing H. R. 408 . . . Senate Document No. 676, 64th Congress, 2nd Session. Wash., 1917. 13p, 9x11½. *6800.0732fs2
- 231 Matters affecting electric and gas interests pending before Massachusetts Legislature of 1917 . . . 39p, 5x8. *1400.031leg

(77) Public Utilities

- 232 The truth about the Cleveland, Ohio, municipal electric plant. L. R. Nash. [Reprinted from Stone & Webster Journal, Feb., 1917.] 23p, 7x10. *2533.N17.039
- 233 Government telephones: the experience of Manitoba, Canada. J. Mavor. New York, 1916. 176p, 5x7½. *039.M449
- 234 Order D: approving and establishing rules and specifications governing joint wood pole line construction . . . in effect April 1, 1917. Public Utilities Commission, State of Connecticut . . . 22p, 6x9, illus. *1604.0294

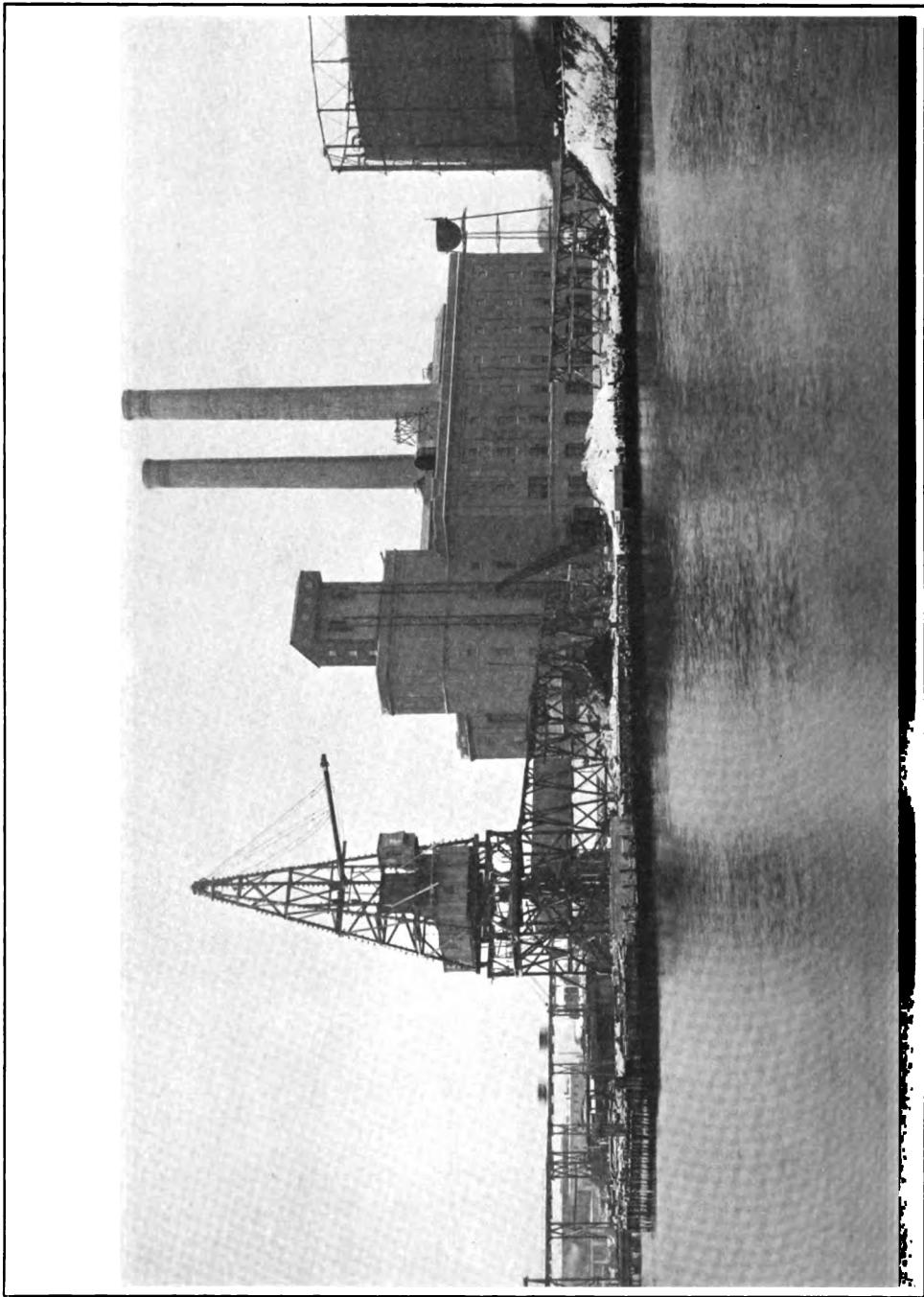
(80) Statistics

- 235 Handbook of the Port of Jacksonville, Florida, 1916. 30p, 6x9, illus, maps. *3641.P83.02.1916
- 236 The year 'round in Duval County, Florida. nd. 32p, 6x9, illus, map. *3640.C832.02
- 237 Special census of population of El Paso, Texas, Jan. 15, 1916. U. S. Bureau of Census. Wash., 1916. 7p, 6x9. *6891.027 Tex (el)
- 238 New Zealand Government statistics. Vol. I: Statistics of population, 1915. Wellington, 1916. 276p, 8x13. *7380.02.Vol. 1.1915
- 239 Insular possessions of the U. S.: Hawaii, Philippine Islands, Porto Rico, Republic of Cuba . . . Harvey Fisk & Sons. [c1916] 119p, 5x7, maps. *6600.F541.02
- 240 Some public and economic aspects of the lumber industry. Studies of the lumber industry. Pt. I: U. S. Department of Agriculture . . . Report No. 114. Wash., 1917. 100p, 6x9, maps. *6800.R114

(90) Statistical

- 241 Moody's Manual of railroads and corporation securities . . . Railroad section 1917. Moody Manual Co. New York [c1917]. 1666p, 7x9½, maps. *022.M77.1917
- 242 Rand McNally & Co's. commercial atlas of America. 1917 edition. Chicago, 1917. 448p, 16x21. *061.R15.1917
- 243 The cumulative book index . . . 1916. The H. W. Wilson Co. White Plains, 1917. 894p, 7x10. C B I 1916
- 244 Annual Magazine subject-index, 1916 . . . Edited by F. W. Faxon, Boston, 1917. 269p, 7x9½. *096.F28.1916
- 245 The American Year Book . . . 1916. New York, 1917. 862p, 6x8. *09.N21.1916

- 246 Navy Year Book: embracing all acts authorizing construction of the "New Navy" and a resume of annual naval appropriation laws from 1883 to 1917 inclusive, with tables showing present naval strength . . . Compiled by B. R. Tillman, Jr. 64th Congress, 2d Session. Wash., 1916. 762p, 6x9. *6800.09n.1916
- 247 Educational directory, 1916-17 . . . Bureau of Education. Bulletin, 1916, No. 43. Wash., 1917. 198p; 6x9. *6873.B43
- 248 Preliminary schedule of volumes of reports and documents of 64th Congress, 1st Session. Dec. 6, 1915-Sept. 8, 1916 . . . Wash., 1916. 11p, 6x9. *6800.096
- 249 Engineering ethics: a bibliography. Carnegie Library of Pittsburgh. [Reprinted from Monthly Bulletin, Feb., 1917.] Pittsburgh, 1917. 17p. 6x9. *096.C211en
- 250 War maps: the fighting countries of Europe and latest maps of United States and Mexico . . . 12p, 19x25. *061.J556
- 251 Market value of old books. In Chicago Public Library Bulletin. March, 1917. *087.C432
- 252 Yearbook of American Institute of Electrical Engineers, 1917. *6910.M51.1917
Same of American Society of Civil Engineers, 1917. *6932.M51.1917
Same of American Society of Mechanical Engineers, 1917. *6950.M51.1917
- 253 Member companies of American Electric Railway Assn., Jan. 11, 1917. 12p, 6x9. *6940.093
- 254 Wood preservation in the United States. W. F. Sherfese . . . Forest Service Bulletin 78. Wash., 1909. 31p, 6x9, illus, map. *6882.B78
- 255 Journal of the American Asiatic Association, 3/17. Asia Publishing Co. New York [c1917]. ASIA.3/17
- 256 First aid to debaters: a list of books on the subject with prices, Published by The H. W. Wilson Co. *096.W693d
- 257 Library Bulletin . . . March, 1917. Sears Roebuck & Co. 75p. 5½x8. *096.Se17.3/17



NEW BEDFORD GAS AND EDISON LIGHT COMPANY'S NEW PLANT

STONE & WEBSTER

JOURNAL

MAY, 1917

EDITORIAL COMMENT

Transportation is a prime requisite in war. Our transportation facilities have broken down. They were near that point in 1914. Yet they have since been allowed to go from bad to worse. For months there has been a shortage of coal, which, unless drastic measures are immediately employed, is bound to become very much more acute. There is not, however, a coal mine in the country that could not have produced far more coal in 1916 than it did, or that could not enlarge its output in the year that is before us. The mine owners would all be glad to increase their yield. Yet what is the use of their doing so? They have been selling all the coal they could get transportation for. It is more steel rails, cars, engines, terminal yards that we need. Until these things are acquired it is idle to talk about mining more coal. Lack of transportation has affected our food supply; and may bring it to a critical point in coming months. It has hampered the distribution of all the necessities of ordinary life, and it is not pleasant to think of what will happen when the exigencies of our participation in the war are added.

* * *

Yet the transportation situation need surprise no one. It is the inevitable outcome of a policy that has had the approval of the nation for many years. The government has taken over from the owners and managers of the transportation companies many of their functions. It has virtually dictated rates, the character of equipment, the amount and pay of labor, the size of dividends. The transportation companies have not been run in accordance with the business judgment of their owners. If they had been they would not be in their present deplorable shape. The government could not or would not see what was bound to happen; neither could or would the public. It was calmly assumed that you could take away from investors the

right of conducting the business in which they had invested their capital and then expect them to put up more capital. Capital has not been forthcoming, however, and for want of it the transportation companies have for years been unable to make the expenditures necessary to keep their plants intact, to say nothing of increasing them to meet the growing population and wealth of the nation. The public has been told time and again by those competent to speak on the subject that this was a ruinous policy—ruinous to public interests—but their words were as unheeded as were those of Noah when he preached the coming of the Deluge.

* * *

At Dallas, Tex., on April 27, occurred the death of Mark Lowd, southwestern manager of the Engineering Division of Stone & Webster. Mr. Lowd was born in Salem, Mass., on January 18, 1870. His connection with Stone & Webster began in 1902 at Seattle. In 1907, he went to Dallas in charge of all the construction work of Stone & Webster in the southwest. By his associates, and in fact by all who knew him, he was regarded as "an eminent engineer and an able executive." He possessed to an exceptional degree the ability to identify himself with the communities to which his business carried him. His merits could be no more fittingly described than in the following editorial from the *Times Herald* of Dallas on April 30:

OUR YANKEE

MARK LOWD is dead. Many people in Dallas knew him. Those who enjoyed his friendship realize what we would like to say about him and they appreciate how weak our words are. Mark Lowd came to the south from Boston. We hope he was a representative man from that New England City, for he did so much to convince us—we of the South—that Boston is just as close to Dallas as Denison or Fort Worth or Texarkana that we like to believe that he has again proven the old saying that a man of truth and honor and love for his fellow man is a citizen of the world.

Our hands are stretched out in sympathy to those friends he left behind in far away New England.

We find a similar tribute to Mark Lowd in the following, from a letter by one of his associates:

"One very striking thing is that practically every one of the employees that worked under Lowd told me they had lost their best friend. This kind of loyalty is hard to obtain in any kind of work."

The War Loan

"The man, be he rich or poor, is little to be envied who at this supreme moment fails to bring forward his savings for the security of his country."

These are the words of the Chancellor of the Exchequer in placing the first British war loan.

Their echo should be heard throughout the United States. For we have reached the supreme moment in the life of the Republic. Nay, the fate of Civilization itself now hangs in the balance. The most frightful war of all the ages has devastated Europe for nearly three years, and at last it has reached our shores. We must fight—not from choice but from dire necessity. The result must be decisive, we must by our effort ensure success to our Allies. Otherwise, the life of no American man, woman or child will ever again be what it has been in the past.

We are not accustomed to such words as these; nothing in our past has ever made them necessary. But facts are stubborn things, and the one great fact in the life of mankind today is that liberty and civilization, as we have understood these terms, are in danger of extinction.

Is there an American of either sex, of any age, of whatever rank in life, that can view this contingency calmly or indifferently? If there be such an one, he is blind to his own well-being. If government of the people, by the people, for the people is not to perish from the earth, we must act, one and all—and act now. Otherwise we shall gamble with fate, and the risk is too great to contemplate.

The first requisite of war is money. Already the European belligerents have spent more than \$75,000,000,000, but our Allies need many billions more. Today the debt of Great Britain is about \$376 per capita; that of France, \$360; and that of Germany, \$290. In 1916 the bonded indebtedness of the United States was only \$12 per inhabitant. In 1913 the wealth of this country was estimated at \$187,000,000,000. Since the beginning

of the war it has increased phenomenally and recently it has been seriously estimated as high as \$250,000,000,000.

If the estimate given above is anywhere near correct, we could spend on the war as much as all our Allies have spent in the last three years and not be poorer than we were when the war began.

This situation will make us the scorn of the whole world, and for untold years, if we do not pour out our new wealth freely in defence of mankind. As a nation we are anxious to play our part in the war as generously and courageously as Great Britain and France and our other Allies have played theirs. The question of importance is not, Have we the money? It is, How can it be collected most rapidly and with the least effect upon the industry of the nation?

The number of persons in this country who ordinarily buy bonds is estimated at 200,000 to 250,000. In the present instance the number must be raised to millions. In Great Britain one person in every six subscribed to the last war loan. It is necessary for us to do as well, and being much richer we should do better than this. One person in six would mean 17,000,000 subscribers to the Liberty Loan. If each of these buys one \$50 bond, \$850,000,000 of the loan will be taken care of. Eight million persons subscribed to the last British loan of \$5,000,000,000, making an average subscription of \$625. If seventeen million in the United States should subscribe \$625 each, the total would be \$10,625,000,000.

There is no one who has not often wished that he might do something splendid for his country. The opportunity now presents itself. Hundreds of thousands, perhaps millions, of our men will a little later on be facing cannon—their lives will be at their country's service. Most of us, however, will lack that opportunity. Yet we, too, can make sacrifices which will cause posterity to say of us, "They deserved well of the Republic."

For our soldiers and those of our Allies cannot fight unless we work and save and contribute the proceeds of our savings to them. A great British statesman said nearly three years ago that the war would be won by "the last \$100,000,000." It is our part to raise the last \$100,000,000. But we must raise a great many hundred millions before the last one is called for.

Come forward with your savings! Make your sacrifice!

Your loss will be your gain. For if you save the world from

the destroyer, as you will if you act promptly, your sacrifice of the moment will mean added good in the end—not only in the preservation of your personal liberty, but in dollars and cents. If each of us should deny himself or herself some temporary comfort or pleasure in order to put \$50 in the savings bank, we should pride ourselves on our prudence. It would not be a sacrifice at all.

If each of us buys a \$50 Liberty bond we shall lend our money to the richest nation in the world. We shall obtain $3\frac{1}{2}$ per cent interest, or almost as much as the savings bank return. The bond will be the safest investment in the world, and will be most easily saleable if you should want to convert it into cash.

But let us be governed by the noblest expediency. No one has ever had such a splendid opportunity to attest his love of country and humanity. Those who subscribe to the Liberty Loan will all their lives be larger and nobler men and women.

The War Taxes and Industry

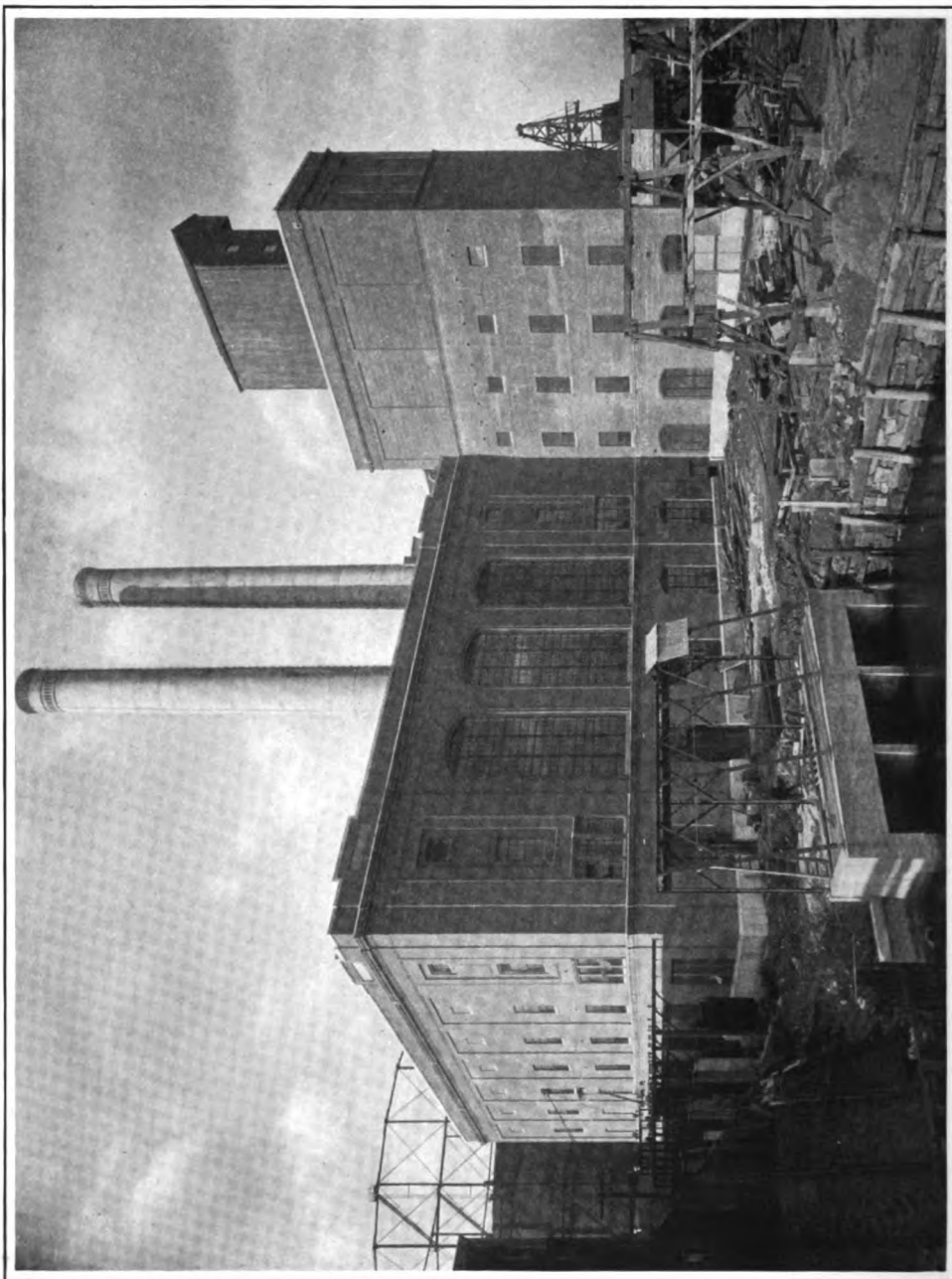
Bismarck's physician had one prescription which he was continually handing to his distinguished patient, "Keep your feet warm and your head cool." It is an excellent prescription and may be commended to the American people at this time. There never was a period when a people had greater need of keeping full possession of its faculties.

It is unquestionably in the matter of financing the war that we need to exercise the greatest care. Ever since the Civil War it has been recognized that great mistakes were made at that time, mistakes which it should be our effort to avoid in the present instance. Congress has already passed a measure for the creation of loans amounting to seven billions of dollars. It is unnecessary to say anything regarding this measure *per se*. We should be prepared to spend all the money that a successful prosecution of the war demands. The matter which calls for the greatest care is that of taxation. As we write, the taxation bill has not yet been voted upon. Our purpose at this time is merely to express hope that the subject will receive the serious and critical attention which the permanent interests of the country demand that it should receive.

The *Quarterly Journal of Economics* for May has just come from the press with an article by Professor Charles J. Bullock of Harvard University, one of the leading authorities

in the United States on taxation, entitled "Financing the War." We shall not attempt to analyze Professor Bullock's remarks, but think it advisable to call attention to one or two of his general conclusions. "Since no one," he says, "can foretell where any war may lead or foresee how long it may last, the military and financial policies of the United States should contemplate a long contest of the first magnitude. The war which has convulsed Europe for nearly three years may be nearer its end than we suppose, but we have no right to take anything for granted, and should prepare for a contest that may demand the complete mobilization of the material and human resources of the country. In finance this means that we need a program. Intelligent foresight and comprehensive grasp of the situation should from the very outset control, and shortsighted or temporizing measures should be carefully avoided. Mistakes can be made during the next six months that will disorganize our currency, injure our credit, and enormously increase the cost of the war. Upon the other hand, by adopting a sound financial program now, we can, with a minimum of friction and waste, raise all the funds that may be needed to finance even this greatest of wars. In such a program the first requisite is obviously economy in all expenditures, public as well as private. For the time being the chief business of the country must be to divert enormous sums from other objects and devote them to the maintenance of armaments."

This statement accords well with Professor Bullock's concluding remarks. After discussing the income tax he says: "The general principle to be followed is that of charging what industry will bear. For the year 1917 commitments have been made, and only a certain amount of readjustment is desirable or possible. In 1918, however, many readjustments will have been effected, and the income tax can be increased to a figure which would not be justified at the present moment. It is not a question of duty or willingness to contribute, but one of changing industries and investment markets from a peace to a war footing. The purpose of Congress should be to effect this transition in such a manner as not to decrease the amount of taxable income, and therefore the source of revenue available in the second and third years of what may prove a protracted war."



NORTHWEST VIEW OF THE NEW BEDFORD STATION

THE ECONOMICS OF A POWER STATION*

BY WALTER GOODENOUGH

I propose to discuss tonight some of the common questions of economics which the engineer in designing a power station is obliged to weigh pro and con. This talk therefore will be different from the usual description of a power station, in which dimensions, sizes and arrangements are discussed in detail, and solely from an engineering standpoint. Of course what I have to say applies particularly to the new station of your company, of which you have the physical evidence near to you and from which you can obtain the engineering data and see the relation of parts to better advantage than by descriptive text or picture.

A most unusual condition in business brought about by the present world turmoil, is responsible, in the case of the New Bedford Gas & Edison Light Company, as in the case of a great many other institutions, for a most radical change in the rate of growth of their business. This change, beginning sometime in 1915, has resulted in the expansion of your generating plant from 8,000 kilowatts to a designed capacity of 52,000 kilowatts and has meant beginning a new station in a new location.

The manner in which this demand has been met by the New Bedford Company indicates a courage and resource far from common.

This expansion comes about largely from the great demand for increased production of the mills and factories of New Bedford and the consequent enlargement of their facilities. These mills and factories, under the heavy pressure from the demand for their output, have in many cases acted along lines of true efficiency, whether they have realized it or not. To be explicit—instead of tying up large sums of money vital to the need of their business in the enlargement of power facilities, they have left that money in their business and have turned to the New Bedford Gas & Edison Light Company for power. In that respect, the factory on the one hand and the Power Company on the other have come very close to the epitome of efficiency. Together they have chosen to divide their energies in order that each shall do the thing it is best fitted to accomplish. In

*A talk to members of the organization of the New Bedford Gas & Edison Light Company, April 16, 1917.

other words, there has been a correct choosing of the correct tools for the completion of the correct piece of work. The result of this efficient directness can not but be of the greatest value to the community, because it has meant that the city of New Bedford has achieved a larger expansion in capital and labor by reason of the greater efficiency of utilization of capital and labor than would have resulted had not this choice been made. You would probably find, if you could trace all the benefits to the end, that this sort of handling of the power situation, with its resultant freeing of resources and energies for full utilization, has permeated beneficially the whole of this community, the stores, the shops, the other factories dependent upon the first factories, and the individuals down to the smallest member of your society. It is to be hoped that the practical results of what in some cases may be considered a "forced experiment" will be such that that kind of pride on the part of mill and factory owners which says they can not produce goods unless they have their own power station may be obliterated.

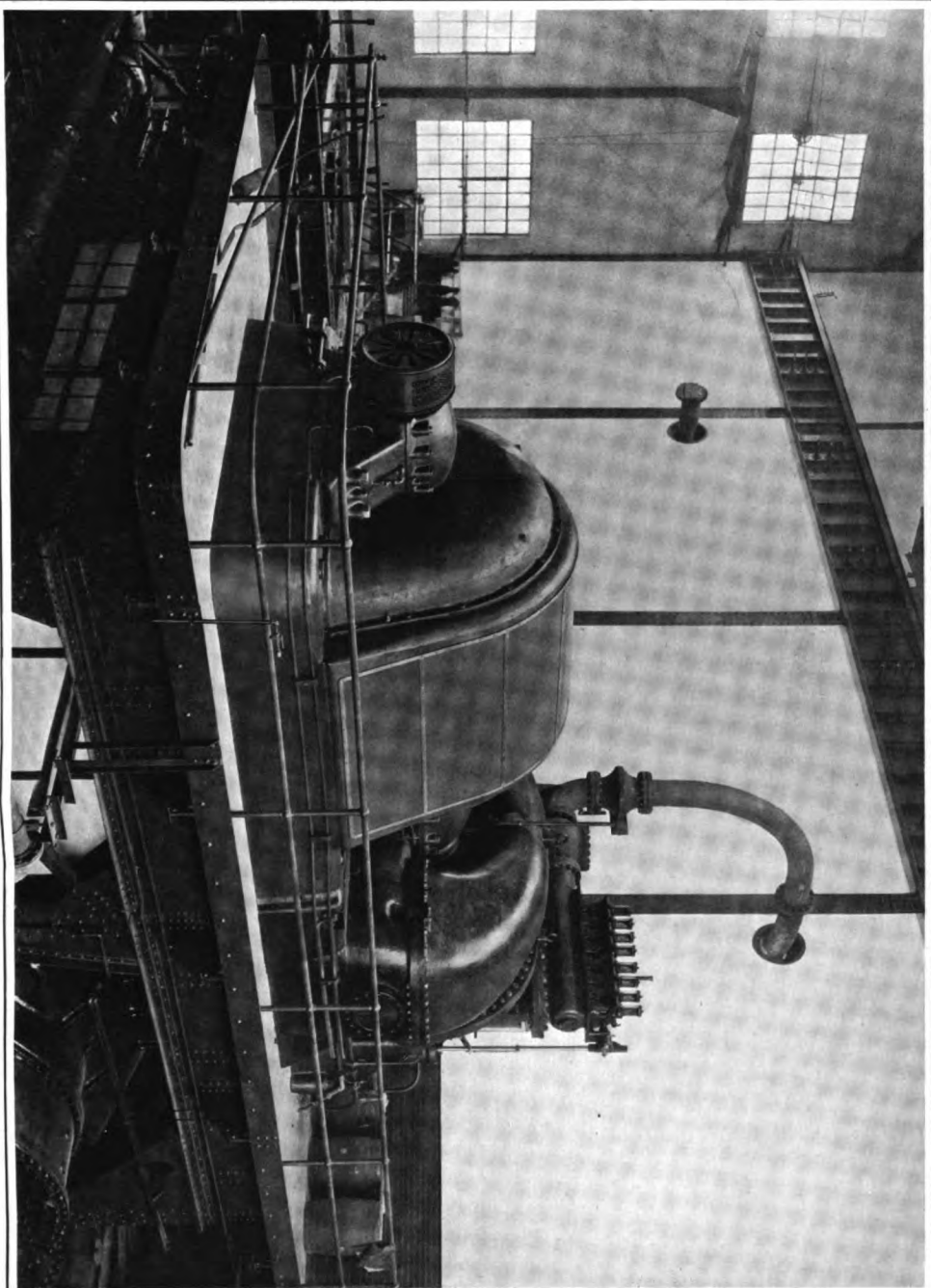
When you first start to think about a power plant you probably begin immediately to calculate what size and what type it shall be. These are most important questions, but before you can decide, precisely at any rate, what the size and type shall be, you must specify its definite locality. All these considerations of size, type and locality, are most thoroughly interwoven; therefore, we will discuss location first.

In the case of New Bedford, the selection of a power station site was influenced largely by the ownership of a goodly portion of the present site; however, that ownership was the result of wise choice and therefore we can ask ourselves—why it is that a power station site, from the standpoint of real estate, is invariably in an expensive location.

There are two prime requisites to the operation of a modern power station;—coal and water, the one to be available at the lowest price, and the other to be ample and close to the site.

The coal bill for a power station forms between 65 per cent and 85 per cent of the total expenditure for the operation of that power station. Thus it is seen that the cost of coal delivered to the furnaces of a power station is of more importance financially, and therefore from an engineering standpoint, than the sum of all the other items which go into the cost of operation. For instance, if the coal bill of a power plant were 75 per cent of the total cost of operation in a year and by improper

10,000 KILOWATT UNIT



location it were necessary to pay for freight, handling, and other fuel expenses, 10 per cent more for that coal, the total cost of operation of that power station would be increased by $7\frac{1}{2}$ per cent. Now $7\frac{1}{2}$ per cent saving in the cost of operation may easily be the difference between dividends and no dividends.

To put this in dollars: If a plant such as New Bedford should use 50,000 tons of coal per year, should pay \$3.00 per ton in one location and \$3.30 in another location, the saving in fuel cost at the first location would be \$15,000 per year; \$15,000 per year is the interest at 6 per cent on \$250,000, a very ample sum of money with which to secure a location which would make a difference of 10 per cent in the cost of your fuel.

What are the particularly desirable qualifications of a location from the standpoint of fuel? They are that the fuel should come in as large bulk as possible, because the freight rate per ton invariably decreases with the size of the bulk in which the material is carried. This makes it desirable that a barge or ship shall carry it instead of a railroad car. The unloading must be handled as cheaply as possible, and the inevitable storage and reclaiming cost must be low. In order to meet these conditions best, a location on navigable waters is greatly to be desired so that the coal may be transported by water. The channels should be as deep and wide as the vicinity permits in order that all possible additional savings may be made in the freight rate by increase of bulk, and the station should be so closely located to this navigable water and this deep, wide channel, that the coal may be put into the station without rehandling other than by suitable and direct conveyors.

The next important feature in fixing the location of a power station is the availability of condensing water, and this is particularly true of a steam turbine station. To give you an idea of the amount of water required for condensing purposes in New Bedford let me point out that the pipes, pumps, and intake and discharge tunnels are designed on the basis of carrying to and from the condensers seventy times as much water as you evaporate for steam. To put it another way—the city of Boston today pumps through its entire waterworks system in one hour just about the same amount of water as the New Bedford condensing system will require in that same hour if the station is carrying a load of 30,000 kilowatts. You can therefore appreciate how important it is that the station be located close to an

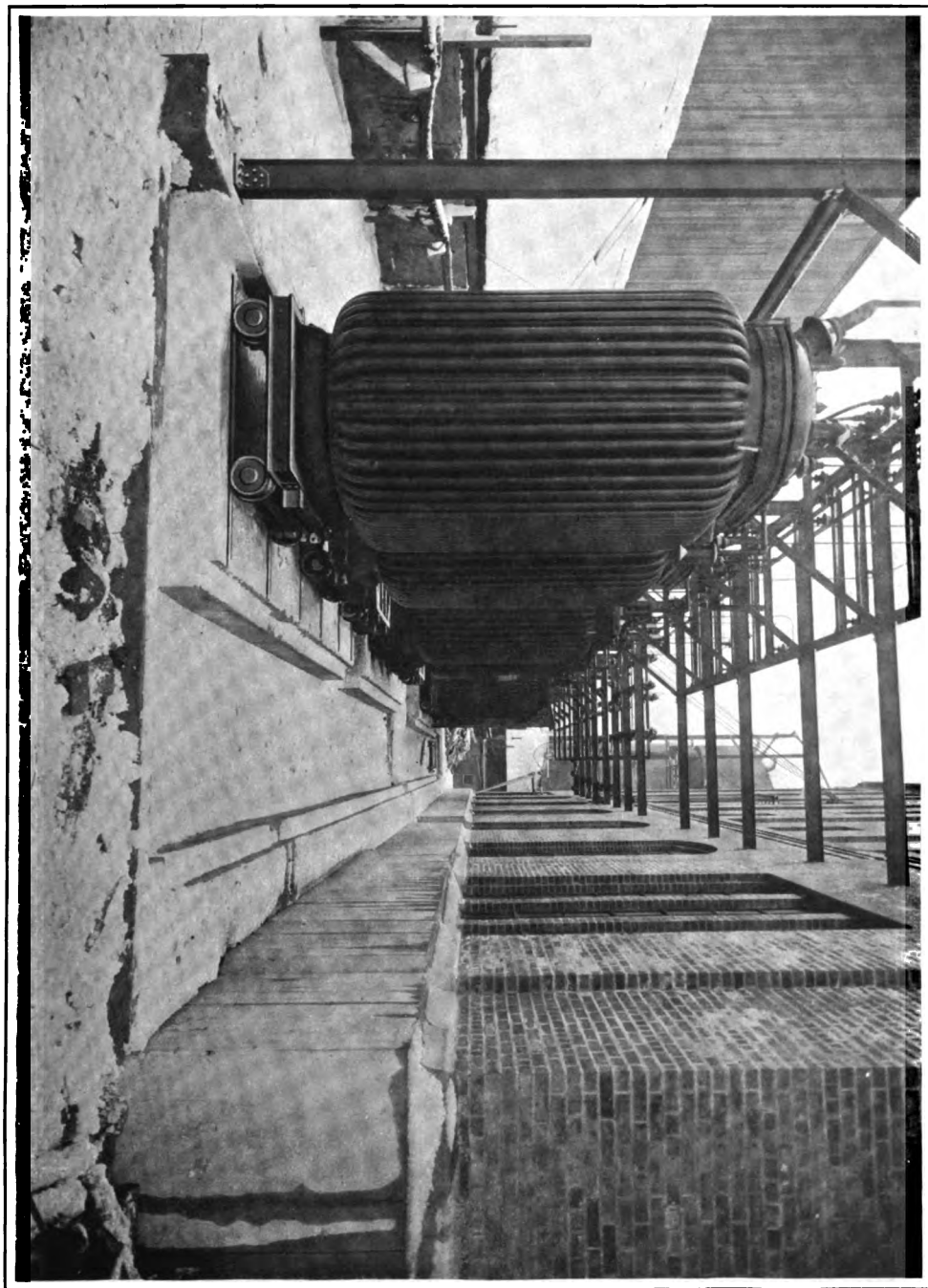
ample supply of water in order to save all possible losses due to friction, and to reduce as far as possible the investment in large water tunnels and piping. This location must also comprise within its limits enough shore line, so that the warm water discharged from the station after it has passed through the condensers will not mix with the incoming cool water.

But why pump all this water? It costs a great deal in power and maintenance to keep these big pumps going, and it is costly construction to build these large reinforced concrete tunnels completely below the lowest water level.

There is a very good reason and it is found in the difference in consumption of steam by turbines when operating condensing and when operating non-condensing. Your larger machines in the New Bedford station will consume at their most economical load about 12 pounds of water per kilowatt hour when operating with a high vacuum; on the other hand they will take 25 pounds or more of steam per kilowatt hour when operating non-condensing. This simply means that to operate non-condensing requires twice as much coal per year. It also requires twice as large an investment in boilers, stokers, and coal handling, and very nearly twice as much investment in prime movers because the capacity of turbines is reduced to nearly half when operating non-condensing. It is easy to see from this comparison that the difference in cost of the fuel alone required between condensing and non-condensing operation would very easily in one year's time pay for even extraordinarily expensive construction for ample water tunnels to secure condensing water.

Having a location that is large enough to contain the station, that has ample and deep water, and to which coal can be brought in vessels, then it is hoped that another important consideration has been taken into account, viz., the location of the station close to the center of load. This is a matter too often overlooked by engineers and business men because it seems so easy to run a few wires around. But suppose the station were so far from the center of load that there was a 10 per cent difference in the loss in lines against what would be the case if the station were in the best location. Then you not only suffer the operating loss in your distribution system, but you also, for the same load, have to increase your power station capacity by this amount. An increase in power station capacity by 10 per cent is a costly matter and not to be treated lightly.

STEP-UP TRANSFORMERS



Other more minor considerations also enter into the choice of location, such as:

It will be very desirable that the location be such that there be an ample supply of feed water available of the chemically purest kind that the vicinity affords.

It is desirable that the fire risk be at a minimum, and that the residential district, if possible, be avoided.

In all these advantages, particularly the more important ones, the location of the station of the New Bedford Gas & Edison Light Company participates to a high degree.

Before starting to discuss the question of type and layout of a power station, it will be well to consider the main subdivisions of the final cost of power, in order that we may better realize the responsibilities before us when we undertake the design of the station.

There are two primary elements which enter into the completed cost of a kilowatt hour delivered to the lines of the company: first—the manufacturing cost; second—the fixed charges upon the investment. Reclassified the manufacturing cost falls into two divisions—that of operation and that of maintenance. The fixed charges fall into four divisions: Interest, depreciation, taxes and insurance. There is one fact about these six items (operation, maintenance, interest, depreciation, taxes, and insurance) which cannot today be denied and that is—they are all increasing. At the present moment they are excessively high, due to the unusual business conditions, but of late years they have shown no tendency to decrease.

The operating cost is increasing because coal and labor are increasing.

The maintenance is up because labor is high and the materials that enter into maintenance are high.

Interest rates are steadily on the rise and the effect in total dollars and cents is further accentuated by reason of the higher cost of construction.

Depreciation is greater, not necessarily in the rate, but because even the old rate has to be applied to a high cost of construction.

Taxes—most of you need no introduction to this subject, and those of you who have failed to become acquainted will probably soon be more familiar with it than you desire. They were increasing even before the great war; they are to have a sudden accretion due to our participation, and they will

probably never again be as low as they were before the war.

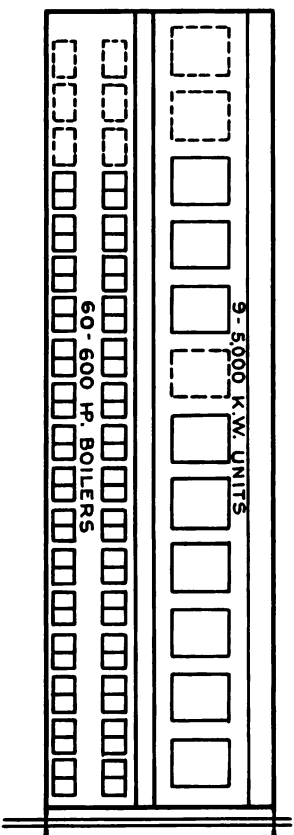
Insurance has followed the leadership of all other items in the above schedule.

Now, you might say that thought on the above subjects is not of particular moment to the engineer, in that they do not settle the question of whether the tensile strength of this piece is heavy enough, or whether that wall will carry enough weight, or the economy of that turbine is low enough, or what not. As a matter of fact, however, just the items which I have named above are most thoroughly mixed into every consideration which an engineer of today should give to an engineering problem. He is forced by all these conditions to exercise every restraint against the incorporation of luxuries and every energy in the development and use of more efficient machinery. He has two places only where he may hope to save on the manufacturing cost, one—a small one—by the replacement of labor with machinery, and the other one, still fortunately large enough to give him some encouragement, the saving in fuel. But he can not spend too much money on these savings without having the fixed charges on such expenditures exceed the saving. The leeway permitted him in this direction today is exceedingly small and getting smaller.

As you all know, the New Bedford station is a turbine station. But why is it a turbine station? Because as compared with stations having other kinds of prime movers, such as steam engines and gas engines, the turbine station is the cheapest to operate, all costs considered—manufacturing costs at the switchboard plus yearly fixed charges on the investment. This result becomes possible because a turbine station makes a more economical use of steam and space than a steam engine station and because it makes a more economical use of investment, space and maintenance than a gas engine station.

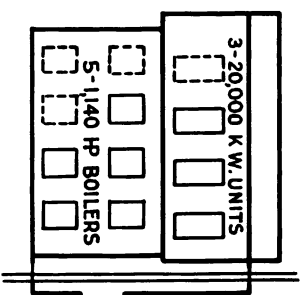
As indicative of the changes in the last ten years in this respect, a slide is shown on the screen indicating a comparison in the investment and operating costs between a large engine station built ten years ago and a similar sized turbine plant just put into operation. The figures give you a very clear idea of the economic change which has taken place in the design of power stations.

When the design of the New Bedford station was first considered, it was to consist of one new 4,000 kilowatt unit, the two 4,000 kilowatt units in your old station, and one new 10,000



LARGE ENGINE-DRIVEN STATION INSTALLED about 1905

Ground Area 138,600 Sq. Ft.
45,000 K.W. Rated Capacity
Construction Cost, Approx. 150.⁰⁰ per K.W.
Operation Cost, Approx. .63 ¢ per K.W.H.



BUFFALO GENERAL ELECTRIC CO. RIVER STATION

Ground Area 53,000 Sq. Ft.
60,000 K.W. Rated Capacity
Est. Construction Cost, approx. 54.⁰⁰ per K.W.
Est. Operation Cost, approx. .25 ¢ per K.W.H.

kilowatt turbine, making a total capacity of 22,000 kilowatts. This new station, therefore, was to be nearly 300 per cent larger than your old station. As an increase in anything other than a "war baby" this is large.

It became necessary, therefore, because all business either grows or shrinks, and because in this case there was every evidence that the business of the New Bedford Company would grow still further, to lay out a station, not only with this first capacity of 22,000 kilowatts, but so planned that all of the future extensions would use the same width, the same height of building, the same size of crane, the same condensing water pumps, the same buses, the same coal handling machinery, and all of the hundred and one things in common that go with a 10,000 kilowatt station, or a 75,000 kilowatt station.

Such a station, to be easy and economical of operation, should have for each addition, or each unit of development, just as few specialties not usable with any or all other units as possible. It should possess no warts, no indentations; in fact, as far as designing skill could go, all the parts that went with a 4,000 kilowatt unit should be as nearly similar or alike as for a 15,000 or 20,000 kilowatt unit, so far as size would permit. All of these things enter into the ultimate result desired—low cost of manufacturing—in the same way that a shop or a factory should be laid out for continuous process and duplication of output.

Reference to the plan and elevation on the screen will indicate this line of endeavor in the New Bedford station.

The width is that width suitable for the largest unit thought possible for the final size.

There is space enough for erection and maintenance, but no more than enough.

The crane reaches every part.

The boiler room moves along in step with the turbine room for length, with only space front and back of the boilers to adequately care for them and the stokers.

Most of the spaces under the boilers usually wasted are given over to direct and useful duties, saving thereby greater width in the station.

The height permits safe handling of the largest part of the largest unit.

The switchboard and bus galleries fit almost exactly the allotted space.

In the direction of length, there is a permanent definite beginning, but a temporary and extensible end, allowing growth at will to the capacity of the property.

All is carried along on parallel lines at equal steps, without protuberances.

This station, in itself, illustrates its own ability to grow, because as begun it was of 22,000 kilowatts capacity, and while in the process of erection was extended first to 37,000 kilowatts capacity, and is today being extended to 52,000 kilowatts capacity.

This then, is the general type and layout of the station, which, it is hoped, will show as low an economic cost, viz., fixed charges plus manufacturing costs, as any of its age and size in this world.

Let us now look at some of the main details of the station:—

Turbines.

There are in your station six turbines of G. E. type:

3— 4,000 kilowatts, 60 cycle, 2,300 volts

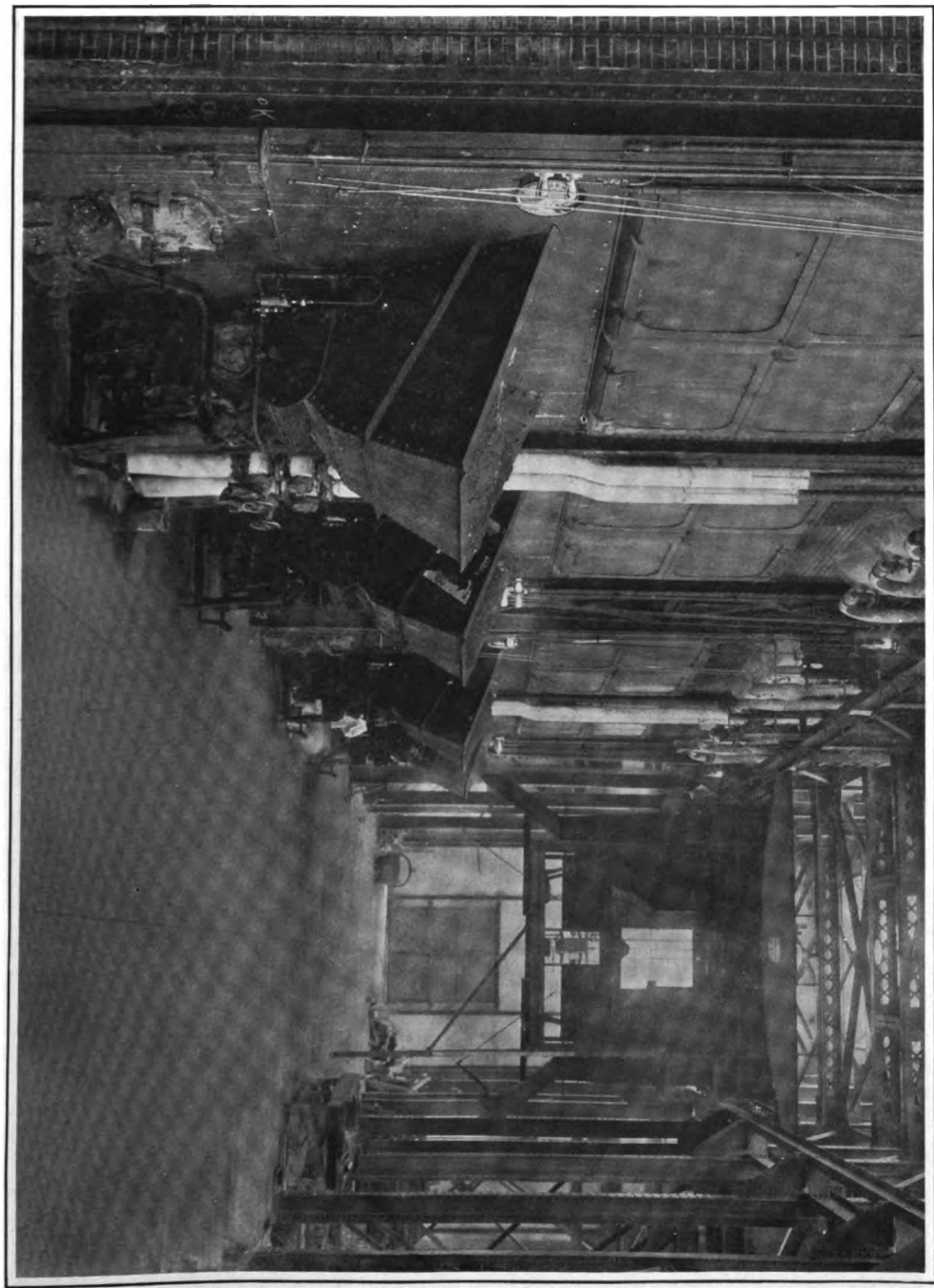
1—10,000 kilowatts, 60 cycle, 13,200 volts

2—15,000 kilowatts, 60 cycle, 13,200 volts

The steam economy of your 15,000 kilowatt turbine, under the conditions of the plant, namely, 200 pounds pressure and 125 degrees superheat, with 29 inches of vacuum, is 11.9 pounds per kilowatt hour. Contrast this with the economies of a 5,000 kilowatt turbine built twelve years ago—and twelve years is not such a very long time. The steam consumption of the first 5,000 kilowatt turbines was 21 pounds per kilowatt hour, or more—nearly twice that of today.

I am calling this to your attention because it is a marvelous achievement, and because we owe a considerable debt to those manufacturers and their engineers who made this result possible. It is hard to realize the tremendous investment put into shops to build the modern turbine, but it is still more difficult to realize the great fund of thought and energy that has had to be brought to bear upon such a radical change in the efficiency of a prime mover in such a short space of time. Very few endeavors along engineering lines have been so assiduously and painstakingly carried forward as have the efforts of these turbine manufacturers to increase the efficiency of their apparatus. In this work they have not only contributed greatly to the splendid reduction in operating costs which we know of, but they have made it possible to cut the investment costs of power stations nearly in half.

BOILER ROOM



In this station we are discussing, there are three different sizes of turbines, and in the 4,000 kilowatt size you have three units, one of which is of recent design, and somewhat more economical than the two which are to be moved over from the old station. But even this new 4,000 kilowatt machine is not as economical as the 10,000 or 15,000 kilowatt machines. Why, then, when we are searching so hard for lower costs of operation, were not all of the units made of the same large size? Leaving out any question of whether the size of the units could have been controlled, let us see how well the smaller units fit into the station.

The two old 4,000 kilowatt machines, which at the same loads cannot begin to compete with the new 10,000 or 15,000 kilowatt machines, are splendid reserve units. You have already invested your money in them, and while to operate them costs more than the newer machines, it does not cost as much as if you had to put in a new machine in order to furnish the station with the reserve capacity they represent and then pay the fixed charges upon the new investment. This net value as reserve units is still further increased when it is realized that they will operate but a short time during any one year, and during the time they are idle they are absorbing no additional fixed charges, as would new capacity, to furnish the same reserve. This is a point often overlooked in the design of stations, and we see apparatus which has outlived its usefulness for steady day-to-day operation discarded and thrown away, when it could be of the utmost value for reserve and relay operation.

There are several different types of condensers that could have been used in the New Bedford station—barometric, jet, and surface. The surface condenser costs more than either of the other types. Therefore, why was it used?

In a surface condenser, the condensing water is entirely separated from, and does not, except through leaks, come in contact with the steam which is being condensed. Therefore, in this condenser, you are taking in steam from the turbine at the top, and taking out at the bottom, a fluid called water, and approaching closely the chemical formula H_2O .

In the case of jet condensers, the steam mixes intimately with the water of condensation, and thus the condensed steam flows away with the outgoing condenser discharge and is lost.

If the station had been located in some place where there was an abundance of almost pure water, which could have been

used to feed the boilers, then the probabilities are that either a barometric or jet condenser would have been used.

In the case of New Bedford, however, all feed water not secured by the condensation of steam has to be purchased, and when you consider that with a station operating at 30,000 kilowatts for one hour, with the necessary boilers operating at about 200 per cent of their rating, you would have to fill each boiler once an hour, it is possible to see the advantage of having some cheaper way of securing feed water than by purchasing it at the usual rates.

Were the jet condensers used under the conditions mentioned above, you would buy from the city several boilers full of water every hour, at a total cost at the end of the year large enough to pay a handsome difference in cost between surface and jet condensers.

While the water furnished by the city of New Bedford is reasonably good boiler water, it nevertheless contains, as practically all natural waters in the world do, a considerable amount of deleterious substances, such as scale-forming salts in solution, mud, carbonic acid gas, etc. All these substances are harm producing in a boiler, and they invariably remain behind to still further concentrate their harmful properties.

It would probably have been necessary, if all of your boiler water were to be fed directly from the city mains, to have installed between those mains and the boiler room a feed water treating plant, in order that you might remove as much of these substances as possible from the water, before you put it into the boiler. This, while very necessary in some localities, even for the make-up water, involves an added cost of operation and investment.

In one station with which we were concerned, and which is now in operation, because of the high rate of evaporation at which it was desirable to run the boilers, it was necessary to install at a considerable cost, both of investment and operation, a complete evaporating and distilling plant. This plant was not for the purpose of supplying all of the water, but merely that part of it, five to seven per cent of the total, known as make-up water, which takes the place of that lost in the piping systems by leaks of one kind or another. This last example is given to show the lengths to which it sometimes becomes necessary to go, in order to secure that degree of boiler water necessary to economical and safe operation. This extraordinary effort was

Handwritten text, mostly illegible due to extreme fading and bleed-through from the reverse side of the page. The text appears to be organized into several paragraphs, with some lines being more distinct than others. The left margin contains a vertical line, possibly a page number or a section marker.

THE UNIVERSITY OF CHICAGO
LIBRARY
540 EAST 57TH STREET
CHICAGO, ILL. 60637

1882 22093

1882 22093

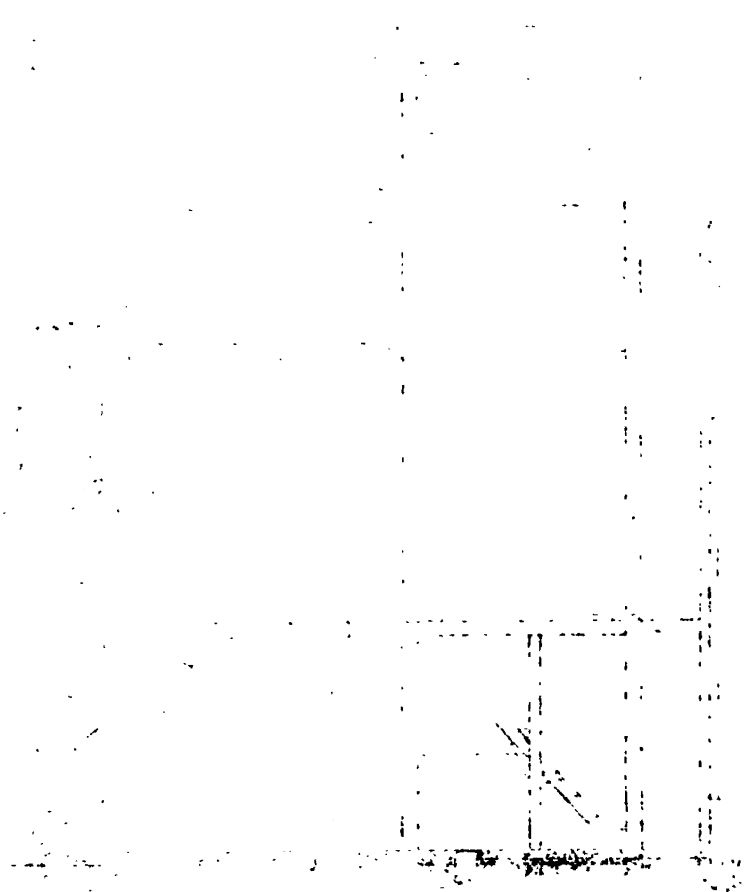
1882 22093

1882 22093

1882 22093

1882 22093

1882 22093



necessary because scale in the tubes means inefficient evaporation, costly maintenance, and increased danger to the boiler.

By the use of surface condensers at New Bedford it is possible to have pure boiler feed water and at small expense.

As shown before, a turbine will use approximately twice as much steam operating against a terminal pressure of three pounds at free exhaust as compared with a minus pressure of 29 inches of mercury, as in the case of vacuum. The value of good vacuum to a turbine plant is illustrated by the chart on the screen. It is apparent that it would be hard to secure too good a vacuum. It also illustrates the prime importance of keeping every part of a vacuum system tight.

Your plant is fitted out with 600 horse power Babcock and Wilcox boilers to operate at 200 pounds pressure and 125 degrees of superheat. Other sizes and kinds could have been used, but until the question of higher pressures and higher ratings is fully settled this particular size of boiler gives just about the maximum of reliability, safety, accessibility and space economy. The question of cost in operation of a boiler plant is largely a matter of design, of installation and of the operating methods used. Because of this fact quite a wide range of makes of boilers will give about the same efficiency, so that the matters left for discussion in the purchase of boilers are principally those questions of space, economy and reliability.

It might be pertinent to remark here, as it applies with full force to boilers, that the finest apparatus that can be made will not produce good operating results unless most intelligently handled; and the reverse is equally true, as shown by instance after instance of remarkable results obtained in old plants where there is a high order of operating intelligence. The operation of a modern boiler plant in the modern methods calls for just that kind of intelligence, and in no place is it more called for.

As in so many other parts of the plant, and in the plant as a whole, there are two main items that affect the total cost of operation, viz., operating costs and fixed charges. You may run boilers at around 125 per cent to 150 per cent of operation and secure the highest evaporation of water per pound of coal, but if you have at all times enough boilers in your plant so that you never exceeded these ratings, even over peak loads of short duration, you would have to very greatly increase the investment in your boiler plant. The number of boilers which you have is not figured on this basis. It is expected that with a reasonable

number of them out for ordinary maintenance, you will carry the maximum peaks to come on the plant at ratings of 200 per cent and over. While the efficiency as expressed in the pounds of water evaporated per pound of coal will not be quite so high at these higher ratings, the total cost, with the fixed charges added in, will be decidedly lower than if you had boilers enough so that you never ran beyond the economical rating.

This is a phase of design which today is being given great consideration in practice. It is fundamentally and economically sound because it makes for the greatest possible utilization of the money spent. Plants are now being designed and put into operation in some extreme conditions where it is expected that the boilers will go over peak loads at 400 per cent of their rating. Of course it is not expected that the boilers will run continuously at any such rating as that, but for the short peak of one or two hours such operation is an economical use of the investment. It is also a splendid commentary on the modern boiler, its materials and its workmanship, that it can, without undue strain and with a very large factor of safety, do this sort of work day after day.

Should your boiler plant have been laid out for such operation as was prevalent twelve and fifteen years ago, instead of a double line of boilers on one floor there would have been a double line of boilers on two floors. You may judge for yourselves the rate at which the investment cost for the plant would have gone up.

Your plant has under-feed stokers. What is the difference between an under-feed and an over-feed stoker? Take a pull on a lighted cigar, you get smoke because in pulling on the cigar you are drawing air through the fire into the green fuel nearer your mouth. From this green fuel you are distilling the volatiles and you blow them out as smoke. They are cool enough so that they do not burn you. A hand-fired boiler, to take the simplest instance, is almost an exact parallel to your smoking a cigar. In other words, it is an over-feed stoker, and because the volatiles which are distilled from the green fuel on top of the fire pass off into the boiler and into the stack without being burned up you have a slight loss.

Now if you can turn your lighted cigar around and put the lighted end in your mouth, and draw on it again, you won't get much smoke; you probably will get more heat than you can stand. In this last performance you have simulated an under-

feed stoker. In other words, the air for combustion passes through the green fuel into the fire and the volatiles are heated and mixed with this air so thoroughly that they burn to complete combustion. The above is a very general and rough description of the difference between under-feeding and over-feeding coal.

The practical advantage of under-feed stokers is very good combustion, and further the ability to take from such stokers very high rates of combustion as compared with over-feed stokers. It is partly due to this general type of stoker that we are today able to operate our boilers at such high ratings and therefore get, with a comparatively small loss in thermal economy, a great efficiency in investment.

But why a stoker at all? It saves labor, and labor is something that we all must conserve as far as possible, for the increasing activities of this world are making demands upon labor faster than the labor itself is produced.

It saves in other ways, however, and in many instances these other savings are greater in dollars and cents than the saving in labor. The greatest of these benefits is in reduction in the amount of fuel used, because a stoker admits of a steady, even, continuous fire of high temperature, uninterrupted by the opening of doors to let in cold air. It saves the periodical blanket-ing of the fire with green coal, temporarily lessening combustion and making other boilers in the plant hurry up at higher rates of steaming so that the pressure will not fall, and it avoids that bugbear of all hand-fired plants, the practically shutting down of each boiler at periods of cleaning fires, cooling off the boiler and setting and requiring a great deal of extra coal to bring it back to the proper temperature and steaming rate.

To sum up, the two great benefits given to us by the modern stoker are saving in fuel by reason of a continuously hot fire of high degree, and the ability to operate our boilers at so very much higher rating that we save on our investment. If, for instance, on a hand-fired boiler we are able to go over our peaks at 150 per cent of rating, whereas with a stoker-fired boiler we are able to go over our peaks at 300 per cent of rating, we have, theoretically, by the use of stokers, cut our boiler investment in half.

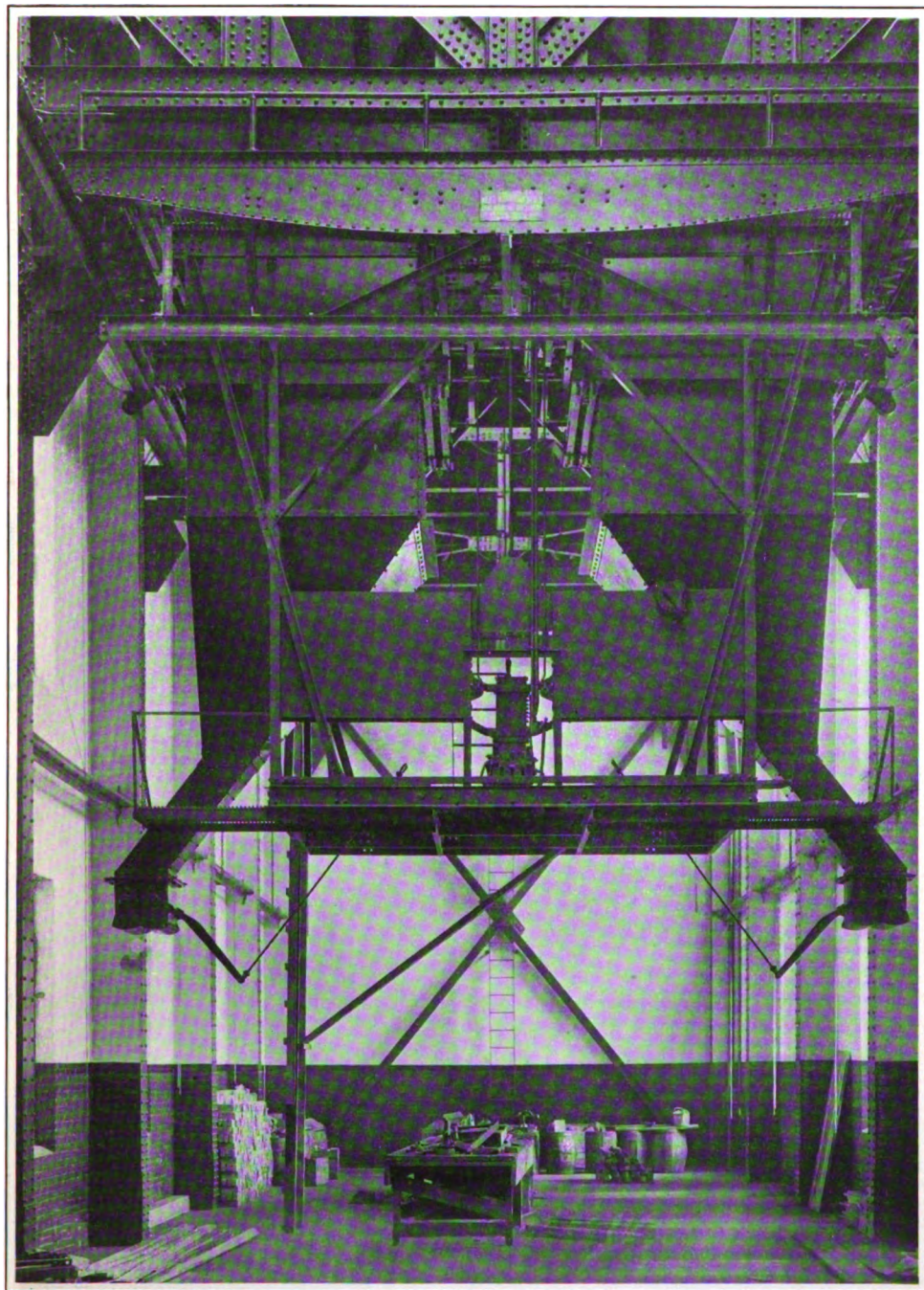
On one of the views shown on the screen you have noticed a thousand ton coal bunker at the end of the station. It was placed in this location in order to obtain, first, a boiler room

thoroughly lighted, well ventilated, and, above all things, a place suitable for the expenditure of 75 per cent of all of the money spent on the operation of the plant. It further was put in this location in order to avoid the additional cost involved in carrying this heavy structure at the top and for the full length of the station.

Boiler plants have been, and are still, often considered necessary evils, and being so considered are made into and kept as the darkest and dingiest hole of the plant. If any real economy comes from such plants it comes principally by luck, and the designer could hardly be credited for this good fortune. If there is any one place in the plant where the apparatus should be accessible, should be well lighted, and where intelligence should be used, it is in the boiler plant. This is the place where you spend the largest share of your money in operation, and too much care cannot be given to this feature of any power plant.

You will notice on the screen a crane, carrying two hoppers, and with ability to travel up and down the length of the boiler room. These hoppers are placed on scales. This larry, as it is called, moves under the bunker at the end of the boiler room, where the hoppers are filled with coal. This coal can then be weighed and the boiler or the watch, or both, can be charged with this precious substance and held to account for its use. With coal today costing one-quarter of a cent, or more, per pound, there is plenty of reason for watching every item of waste in its use, when 100,000 to 200,000 pounds per day are being burned up. It would seem, in a situation like this, that no check on its use could possibly be too critical.

New Bedford is of a peculiar conformation. In the past, in order to meet this condition, current has been fed out of your station at 2300 volts, and 22,000 volts. It became necessary, in order to avoid a large expense in line changes, and substations, to make a substation within the power station. Thus, in order to save the company in total investment and because the losses at the present time would not be considerable, the electrical bay of the New Bedford station contains a greater provision for feeders, switches and other electrical apparatus than it was necessary to provide at the Keokuk water power plant on the Mississippi River, where there is installed a total capacity of 150,000 kilowatts, or three times as much as contemplated at New Bedford.



TRAVELLING COAL LARRY

Most of you have been through at least one electrical disturbance and can realize how wide an area of destruction is created when some real trouble occurs on the little wires carrying the current, particularly if the voltage be more than 2300 volts. For this reason special effort has been made, as should be made in all modern stations, to isolate as far as possible each piece of electrical material.

The cables are no longer carried openly through the station, but are housed in fire-proof ducts, carried up walls between barriers, and placed in compartments. Each oil switch is in a reinforced concrete structure so strong that the explosion of any one switch is confined to itself and not allowed to wreck its fellows. The street lighting equipment is isolated by itself. Voltage regulators on the lighting feeders are confined also in a place by themselves. The 2300 volt and 13,000 volt systems are completely separated, and, in turn, each of these systems is divided into two buses; they also being separated from each other by solid walls.

The cost of this care in the design of electrical bays, while large enough in itself, is small as compared to the increased safety given human life and the increased continuity and steadiness of service toward which all self-respecting electrical supply companies are working. This extra expense is an important contribution, probably to be wholly unrecognized, to the community of New Bedford.

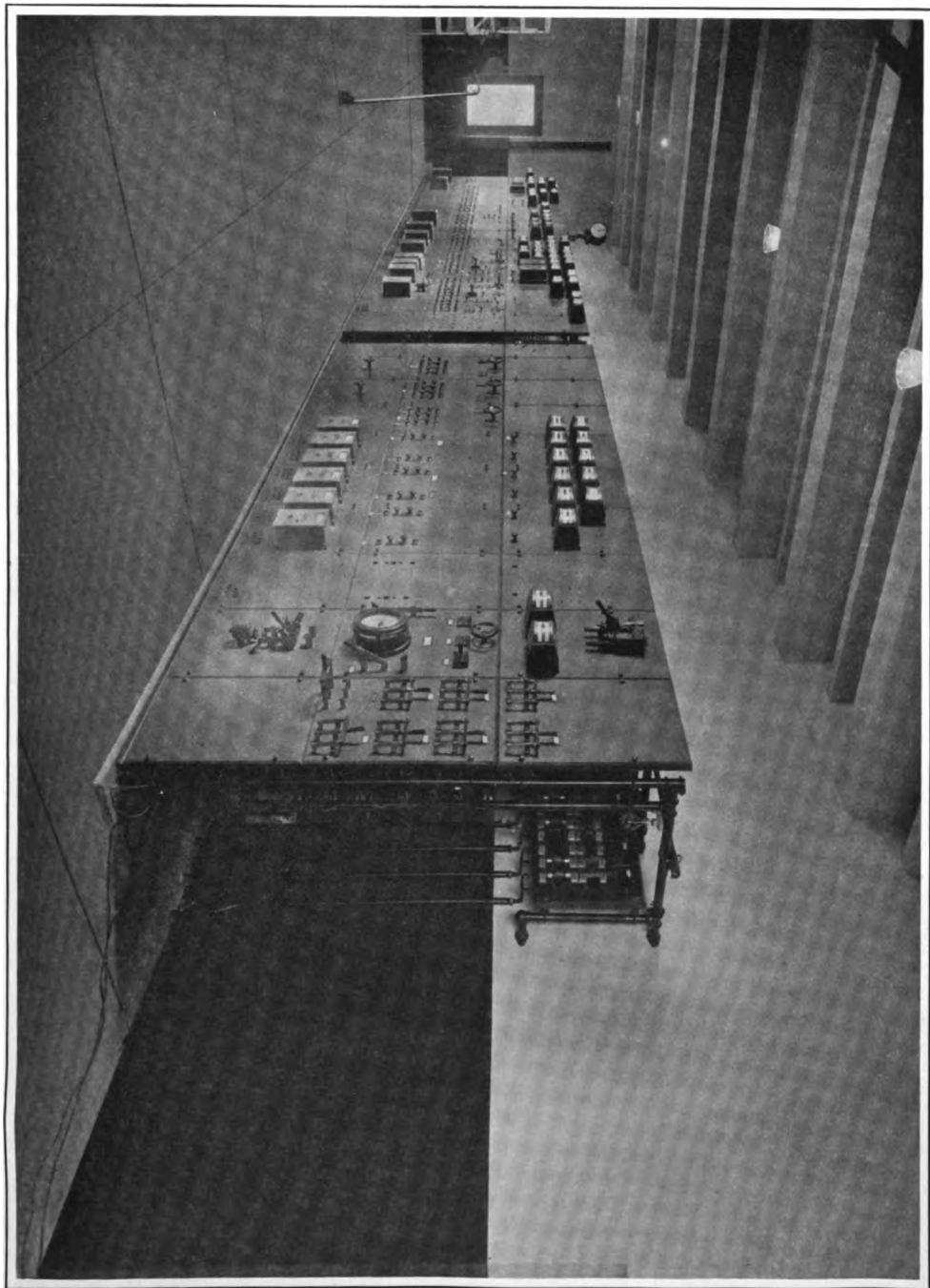
The modern company is also called upon not merely to safeguard its service up to the amount of the demands on it, but it must supply reserve so that you have spare generating capacity, spare boilers and spare auxiliaries. You, as representatives of the New Bedford Company, can well afford to be confident and certain that no privately owned or operated plant in connection with mill, factory and office building, can give the real, efficient, continuous service that you can. It is well for you to bear this in mind because your attitude and confidence is bound to be reflected upon the thoughts and actions of others and you have cause to feel proud of the service your company is capable of giving from its new Cannon street station.

Finally, we must have a building. While some electrical apparatus can stand out in the open, most of it has a great aversion to dampness in any degree and must be housed. Unlike a great many buildings, a power station structure has no

excuse whatsoever except to house its operating machinery. It should not have added to its proportions any size or embellishments other than those which come naturally to it. Its proportions must be those which its use indicates. It is a semi-public building and therefore its exterior should be dignified, but that dignity must be obtained only by that amount of good proportion and that quiet outside which the limits of the use of the building will permit. Internally there should be nothing except that which contributes to the operation of the station. There is no reason why all materials should not be frankly displayed in their true guise and appearance. The only veneer that is permissible is the paint for the protection of the materials and the diffusion of light. I believe that your New Bedford power station building fills these specifications; certain it is that no other specification was considered in its design.

In closing, let me remark upon the great satisfaction we, as engineers, have had in doing work for this company. It is that supreme satisfaction that every one has in working for and with people who understand clearly what they want and who know how to accept special and particular assistance in their problems. You have in addition to a competent power plant a most competent organization in which you and your community can place the utmost confidence.

SWITCHBOARD ROOM



MARK LOWD

**In the fullness of his service has
been taken from us, but we who
have known him will not relin-
quish the great gift he made us
of his honor, his pride nobly
to do the right as he saw it,
his loyalty, his unfailing cheer-
fulness, his sympathy, and his
unselfish strength**

PRINCIPLES OF PUBLIC UTILITY FINANCING*

BY L. R. NASH

The combined capitalization of the public utilities in the United States is not far from \$10,000,000,000. Included in the public utility group are electric light and power companies, electric railways, gas companies and telephone systems. In a very general way it may be stated that about one-half the total capitalization is made up of indebtedness, the other half of stock. There has been a remarkable increase in the capital requirements of public utilities in recent years. The present total is approximately half the combined capitalization of steam railroads in this country, and the ratio is steadily increasing.

While the requirements of public utilities for new capital during the last three years have been very much curtailed, the normal needs to take care of improvements and expansion amount to approximately \$500,000,000 per year or one and two-thirds millions per business day. The collection of this large amount of money from investors and its appropriation for construction purposes is no light task.

It is only within the last generation that public utilities have entered the general money markets for their financing requirements. Previous to that time, the comparative newness of this class of business and the unseasoned character of its securities restricted the distribution of these securities within quite narrow limits. This situation no longer exists. On the contrary, the comparative general stability of public utility investments has created a very favorable impression in investment markets. During the general business depression in 1907 and 1908, when railroads and industries generally experienced considerable losses in net earnings, public utilities as a whole not only did not experience losses but continued to make substantial gains.

In order to attract a wide range as well as a large number of investors to the public utility field, and to take care of rapidly increasing requirements for funds, there has gradually been developed a group of securities with such a range of

*This paper embodies in part the substance of lectures given by Mr. Nash to students in the Business Administration Department, Massachusetts Institute of Technology.

safety, stability and rate of return that any class of investors, whether primarily seeking security or a high rate of return, may find its needs fully met among public utility issues.

The fixed capitalization of public utilities commonly consists of mortgage bonds and preferred and common stock. These fixed issues are temporarily supplemented by coupon notes and transient borrowings of funds, usually from banks. The relation between the different forms of permanent securities, their special characteristics, and their development to meet the varying requirements of investors, will be the principal field of this discussion.

Bonds

The mortgage bond, the common form of public utility fixed indebtedness is simply a fixed term loan secured by a mortgage upon the borrower's property. The usual term is 20 to 50 years, this term being influenced by franchise limitations. The conventional rate of interest for such bonds is 5 per cent although a tendency to increase to 6 per cent is now noticeable. Such bonds are a lien upon the entire property of the utility, and all additions thereto are automatically included under the mortgage. These mortgages provide that in case of the failure of interest payments or other obligations, the trustee may take possession of the property and operate in the interests of the bondholders. Many other requirements and restrictions have been developed to prevent, as far as is humanly possible, any loss or wasting of property or any improper use of it which would jeopardize either interest or principal of the bondholders.

To further insure protection of principal at maturity, provision is usually made for either increasing the amount of mortgaged property in proportion to the outstanding bonds or gradually decreasing the amount of bonds in proportion to the mortgaged property. Such protection is furnished by improvement or sinking funds. An improvement fund requires that each year a certain sum, or a percentage of the outstanding bond issue (usually 1 per cent or 2 per cent), shall be spent in permanent improvements covered by the mortgage but without additional bond issue. The sinking fund, which is now more popular with investors, provides that a certain percentage of the outstanding bonds shall be retired each year through cash payments by the utility to the trustee. The trustee may

purchase in the open market or the bonds may be called at a stipulated price slightly above par.

The standard form of mortgage definitely limits the amount of bonds issuable thereunder, this amount being considerably larger than the immediate requirements. When the authorized limit is reached, the utility is in the embarrassing position of requiring further additions to its property, all of which are included under the mortgage through its "hereafter acquired" provisions, but which must be financed in some other way than by bonds. The usual solution is the organization of a new company to take over the property of the old and to acquire necessary new property under a larger consolidated mortgage.

To avoid this difficulty, a new type of bond, the total issue of which is not limited, has been recently developed, the mortgage under which it is issued sometimes being referred to as an "open-ended" mortgage. Such mortgages, while setting no fixed limit to indebtedness thereunder, carefully prescribe the percentage of additional investment which may be covered by bond issue. The issue is further restricted by fixing the relation between the total interest requirements and the current outstanding balance available for interest payments. The balance is usually required to be not less than $1\frac{1}{2}$ to 2 times the requirements. These and other restrictions which omit no necessary or desirable protection to the investor, save the expense and disturbance incident to the reorganization otherwise necessary.

With the well developed safeguards above described, public utility bonds are held in large numbers not only by individual investors but are also to be found among the holdings of banks, insurance companies and trusts.

Capital Stock

The original form of proprietorship in public service corporations was evidenced by capital stock, each share of which represented an equal interest in the profits and assets of the corporation. Subject to any outstanding indebtedness, the holders of this stock had full ownership and control of the property. This form of stock involves maximum simplicity of proprietorship and is quite common in Massachusetts, but it lacks sufficient flexibility to attract a wide range of investors. Many investors, not satisfied with the returns from

bonds, question the security offered by capital stock issue and seek other kinds of investment. This can be and is overcome to a large extent by division of the stock issue into two groups having different security and income characteristics, these groups including preferred stock and common stock respectively.

Preferred Stocks

A preferred stock is so called because it has prior rights to dividends and to assets in case of liquidation over the associated common stock. Dividends are necessarily limited, usually to 6 per cent, although with rising money rates a 7 per cent preferred is not difficult to foresee. In case of liquidation, the preference of this stock is usually limited to its stated par value, but it may be previously retired at a stipulated premium, assumed to be not less than its possible market value, commonly between 105 and 112 or 115.

This preference, applied to a minor part of the total stock issue, gives it a security which attracts a considerable number of investors. It has, however, in very many cases been found desirable to make preferred stocks still more attractive than by the priority above explained, so that they would approach more nearly to bonds with respect to their regularity of return. The first step was to make the dividends cumulative so that the common might not participate in profits until all deferred preferred dividends had been paid up to date. In the case of public utilities, newly organized in a field which has not been developed or where for other reasons the initial profits are small, it is customary to defer the cumulative feature on the preferred stock for a brief initial period, say 2 to 5 years. In a few cases, it is required that a reserve, equivalent to two or three years' dividends, be accumulated before the common is allowed to participate.

With such added safeguards, preferred stocks are becoming increasingly attractive to conservative investors. A 6 per cent preferred stock will usually sell slightly below par, giving the purchaser a possible speculative profit as well as a higher return on his cash investment.

In voting, preferred stock usually has equal rights with common with respect to general corporate matters, but may not vote upon the question of additional issue of other stock or with reference to its own retirement. In some cases there are other voting restrictions in favor of common stock which

tend to place the preferred still more in the position of a silent partner.

Common Stock

Common stock, issued in connection with the preferred already described, owns the entire remaining equity in the property after necessary provision has been made for the indebtedness and preferred stock. Common stock is usually issued in sufficient amount to carry control of the property. If the issue is not relatively too small and the business is prosperous, the equity represented by the common may be very large and valuable. There is no limit to the dividends which may be earned and declared except as fixed by business judgment, competition, regulation, etc. Because of the possibilities of large profit, common stock may reach market values very much above par, whereas preferred stocks with their dividend limitations rarely go appreciably above par except in cases of unusual business stability.

It will readily be seen that the common stock of a well managed and profitable corporation may be very attractive to investors who for the sake of liberal return are willing to run the risk of unforeseen reverses or disasters. The common stockholders are sometimes given the right to limit additional issues of preferred stock to amounts not exceeding contemporaneous issues of common. The common may also vote to retire the preferred at its fixed call price, and may also call outstanding bonds, thereby securing to itself the entire benefits of the corporation's activities.

It thus appears that careful provision is made to guard the rights of the common stockholders to their equities, to compensate for the risk assumed in accepting what may be called the "leavings." Having with equal care safeguarded the investments of the bondholder and preferred stockholder, it is quite proper that the common stockholder should permit no encroachment upon his equities.

The laws of most states require that stocks shall have a designated par value and that they shall be paid for at par, either in money or service or through construction contracts which fairly represents the par value in question. Under the laws of most states or the regulations of their public service commissions, fees may be paid to brokers for their services in selling stock issues to investors, this fee being usually limited to not more than 10 per cent. Such payments should be dis-

tinguished from the discount at which bonds are commonly sold, which discount must be amortized during the term of the bonds. There are cases of authorization by public service commissions of the sale of stock at a real discount, presumably with amortization of the discount in an arbitrarily fixed number of years, but such cases are rare.

Bonus Stock

It was for many years the practice of public service and other corporations, unrestrained by legislative enactments or commission regulations, to stimulate the sale of their initial issues of securities, by the use of so-called "bonus" common stock. This stock was given to purchasers of bonds and preferred, these securities being issued in so-called "blocks," a block consisting, for example, of ten shares of preferred stock and two to five shares of common, for which the investor paid approximately the par value of the preferred. In the original financing, in addition to this bonus stock, a certain amount of the common was also issued to promoters and bankers for their services in inaugurating and financing the enterprise.

Such issues of common stock have been habitually referred to as "water," but a careful analysis of the more conservatively handled promotions will show that the common stock so issued represented real or prospective value. The services of a promoter who develops a useful enterprise and of a banker who assumes risk in financing it are worth more than can be represented by a normal daily wage and, if their ultimate reward is proportional to the success of the enterprise, substantial justice is done to all concerned. Such proportional reward is secured by partial payment in stock.

As far as concerns the investor who receives bonus stock, he very often receives no dividends whatever from his investment in early years, and succeeding dividends are not sufficiently liberal to compensate him for his early losses. It has often been determined with considerable accuracy from public utility records that the bonus common stock issued to investors is no more than sufficient to compensate, through its ultimate market value or dividends, for inadequate early returns.

A few public service commissions, recognizing the initial sacrifice of investors and the necessity of offering some attraction in order to secure funds for worthy developments,

have approved the issue in advance of stock not required for physical property but representing the estimated inadequate return during the early years of the enterprise. The Wisconsin and Michigan commissions have established precedents for such action, which should not be confused with the allowance for going value approved by the former commission in rate cases. Such initial authorizations, however, are comparatively rare and the laws and practices of other states provide no inducement to investors to furnish funds for more or less speculative ventures. Such inducements are quite essential to successful financing. No prudent investor will pay par value for the stock of an enterprise that has no definite assurance of success, and the failure to provide or permit suitable inducements to investors has seriously hampered and prevented developments, at least in public utilities, in many states.

Common Stock without Par Value

The difficulty arising in connection with promotions where bonus issues of common stock are not permitted might be avoided by removing the dollar mark entirely from this class of stock. Without such designation, which in fact has little real significance, common stock certificates would in fact represent what they really are intended to represent, a proportional interest in the returns and equities of the business. The absence of par value would remove any misleading suggestions as to value which otherwise is often assumed by those not familiar with the situation.

The practice of issuing common shares without par value was started in Germany some years ago and has met with decided success. In this country, the state of New York specifically authorized their issue by legislative enactment in 1912, and they are permitted under certain conditions in some other states. Four years before this New York authorization, the Public Service Commission of the Second District pointed out the advantages of such stock so clearly in a capitalization case under consideration as to justify the following quotation from the decision by Commissioner Stevens:

"The harmfulness of excessive issues of capital stock of corporations serving the public arises from the fact that stock of a given face value has not behind it property equal in actual value to the face value of the stock. The result is that the owners of the stock naturally assume the value of the corporate

assets to be at least equal to the face value of the stock, demand an adequate return upon the same, and in the effort to secure such return, both demand excessive prices for services rendered and unduly impair and cheapen the service.

"The stock in the natural course of business, falls into the hands of bona fide purchasers, who buy the same upon the assumption that it is issued dollar for dollar of value. Any effort to reduce prices for services rendered, after stocks have fallen into the hands of such holders, is fought, as tending to impair the value of existing securities and unsettling the basis of all corporate transactions. This last trouble arises from regarding the share of stock as representing value to an amount equal to its face value. Were all stock issued for full value, this might be true for a brief interval, but in the practical course of business such equality rarely exists. In a successful business the value of the stock enhances; in an unsuccessful business it depreciates. It cannot well happen that the value of property invested in a going enterprise will remain of the same value permanently, or even for any considerable period.

"The fact is, a share of stock represents only a given fractional part of the assets of the corporation. If the entire capital stock is one hundred thousand dollars, divided into shares of one hundred dollars each, one share is in fact no more than the evidence of ownership of a one-thousandth part of the corporate assets upon final dissolution and division, and of a right to a one-thousandth part of any dividend which may be declared. It has not any direct proper value beyond these two rights. If no dividend can properly be declared, the stock has no value as evidence of a dividend right. This dividend right is simply an ownership of a given part of the net earning power of the business. To say that stock is entitled to any given rate of dividend is a logical absurdity—a confusion in language—since it is only evidence of a right to another and vastly different thing, namely, the right to a proportional part of the net earnings of the business. If once the public mind could be brought to regard shares of stock, not as property in themselves, but as evidence of a right in property, we might hope to be rid of the deceptive notion that the par value of a share of stock is the slightest evidence of its real value, or is any evidence of the dividend returns to which the owner is entitled.

"It may well be considered a matter worthy of grave reflection whether in the case of at least all corporations here-

after organized a certificate of stock should have no par value, but should state only that the owner is entitled to a named proportional interest in the corporation. Every prospective purchaser would then be required to get a notion of the value of the property from a source other than the sums named on the certificate. The owner could not expect or demand returns upon a fictitious basis. The real would supersede the unreal in most investigations as to corporate values."

The advantage in common shares without designated value is not confined to initial financing operations, but is applicable also to subsequent capital requirements. The condition of certain prominent utilities in Massachusetts bears striking evidence to this fact. Massachusetts law requires stock to be sold at not less than par, also that bonds be not issued in amounts aggregating more than the outstanding stock. With the market value of stock below par and the full authorized issue of bonds already outstanding, no alternative means of financing remains except temporary borrowings which have narrow limitations.

There are doubtless objectionable features to stock issues without value designation that will require careful study and experience to eliminate, but the definite advantages obtainable in the end justify more extensive attention and use than so far accorded in this country. Common stock, as already indicated, represents only residual equity when issued in connection with bonds and preferred. A designated par value is necessary for preferred, but the wide possible fluctuation in the equity represented by the common is quite consistent with the absence of such designation.

It is believed that such stock offers opportunities for ultimately profitable development of useful activities in fields where commercial, industrial or agricultural expansion is now hampered by lack of utility service.

Rights

It is the usual practice in connection with the issue of additional stock of corporations to allow existing stockholders to purchase their pro rata proportion either at par or at a price materially below the market value although possibly considerably above par. These so-called "rights" of existing stockholders are of considerable value in the case of a growing business. If the stockholder does not care to add to his holdings, he

can sell his "rights" to others and such sales are quite common. Their value may be illustrated in an approximate way as follows: A corporation whose stock has a market value of \$130 issues additional stock to the extent of one-sixth of the outstanding issue. If the existing stockholders may purchase at par instead of 130, or may transfer their rights so to do to someone else, this right to purchase one share in six is worth theoretically \$5.00 per share. As a matter of fact, the market price of rights is usually somewhat below their theoretical value because of possible depreciation in market value of shares through the increase in number.

The supplementary revenue from rights, explains the comparatively low direct rate of return which investors sometimes accept from their stock holdings. In Massachusetts, for example, where rates of return on market value of non-taxable stock may be as low as 4 per cent, arising perhaps from an 8 per cent dividend on par value, it may happen that the sale of rights brings the actual return up to approximately 6 per cent. In fact, as the possibilities of income from the sale of rights disappears because of absence of new construction requirements, the market value of stock in the case of stable utilities will fall to a point which will directly yield approximately the 6 per cent referred to upon the investment.

Many people, including some vested with regulative authority, overlook the fact that the direct return from an investment is rarely a true measure of the full rate of return which the investor expects. This rate is affected not only by the rights above referred to but also by appreciation in market value which occurs as loans, made at a discount, approach maturity or as business developments and improvements permit higher dividends. Without such influences the market for these securities would be seriously curtailed.

Coupon Notes

For short-time financing, it is customary for public utilities to issue so-called coupon notes bearing interest at 5 per cent or 6 per cent, these notes running for a limited term, usually two to five years. These notes are somewhat similar in form to short-term or debenture bonds but are not secured by mortgage upon the property. Existing mortgages take precedence over coupon notes in case of receivership, but subsequently issued bonds may recognize the prior rights of coupon notes.

Such notes are usually sold at a slight discount so that, with short-term amortization as well as fairly high interest requirements, the total cost of money to the utility is high, possibly as high as 8 per cent or more in unfavorable times. Such notes are usually made callable at par or a very small premium on any interest date or on 30 days' notice and sometimes have a convertible feature by which at maturity they may be exchanged for an equal par value of common stock. This provision is made where the common has a market value considerably above par and serves to "sweeten" the original offer of notes.

Distribution of Securities by Classes

The general class of securities issued by public utilities from time to time for extensions and betterments varies with the following factors:

1. The age of the business.
2. Profitableness of the business at the time of the issue.
3. General market conditions.
4. Amounts of each security already outstanding.
5. Use of the proceeds of the issue.
6. Franchise conditions.

Bonds are issued in limited amounts at the beginning of the enterprise, because of its limited initial earning capacity, in order to avoid receivership and reorganization. They may be issued more freely as the business becomes stable but is still not particularly profitable. They are well adapted to the financing of comparatively unprofitable extensions. Some states limit the proportion of investment which may be covered by bonds, and such limitations are common in mortgages, where 75 per cent to 80 per cent is the usual limit. A study of a considerable number of conservatively financed utilities shows bond issues averaging about 50 per cent of the total capitalization.

As business becomes more profitable as well as stable, the issue of bonds is curtailed and stocks are substituted. Preferred stocks usually represent a smaller percentage of total capitalization than either bonds or common stock. Such limitation is necessary to secure the degree of safety which investors seek in this class of security. Preferred stocks are sold to finance new construction when the utility's financial condition is fairly good, with promise of improvement, but when the showing is not quite good enough to yield par or better from the sale of common stock.

Common stock is a prosperous time issue as far as additional sales for new construction are concerned. As the common stock first feels losses from business reverses as well as enjoying the benefits of prosperity, it is not readily marketable unless existing conditions and future prospects are quite favorable. The immediate effect of jitney competition two years ago upon the value of common stocks shows most conclusively the sensitiveness of such stocks to business reverses. Ordinarily the total issue of common stock will be found to be more than 25 per cent of the total outstanding securities.

Coupon notes are resorted to in times of general business depression or financial reverses of the issuing property or near the expiration of its franchise. Large quantities of such notes have been issued during the war period by utilities, railroads and industrials, partly because of the unfavorable market for other and longer term issues and also because investors were reluctant to tie up their money for a long time at any rate of return.

The above brief and elementary outline attempts to trace the development of different classes of permanent public utility securities and to define their scope and limitations. It is earnestly hoped that the outline of the defects and restrictions of fully paid common stock of designated par value may lead to further study of the possibilities of the alternative issue without the dollar mark. Throughout the country communities are constantly demanding improvements and expansion of the utilities which serve them. Throughout the country also investment capital is obtainable in abundance under conditions which it thinks reasonable. These conditions are not fully met by utility security offerings under present restrictions. Unless, therefore, the restrictions, some of which have been discussed herein, are modified, capital will continue to flow in other directions, utility development will be hampered and reasonable community demands for service will fail of fulfillment.

UTILIZING THE WASTE FROM COAL MINES*

BY HENRY HULL

Students of economics have often replied, when questioned as to what will happen when the mineral resources of the earth are exhausted, that science will, by that time have either discovered a substitute for the product or invented some means whereby the great wastes incident to present methods of production can be utilized. Their theory has proven itself to some extent of late years by the strides made in the mining of precious metals. Low grade ores are being successfully mined today which would not have been considered some years ago, and huge dumps of tailings from exhausted and abandoned mines are being worked over again with commercial success.

The possibility and necessity of using the waste from coal mines is just beginning to attract the serious attention of engineers. Perhaps the most prominent factor in hastening the investigation is the abnormal situation in the fuel oil market. The price of fuel oil in this section of the country has always swung like a pendulum from year to year, but has never before reached the high price at which it is today, and while it will undoubtedly be available in future at a price lower than the present market it will probably never reach the figure of past years where it can be profitably used by large central stations. The principal factors influencing the price are the abnormal demand both foreign and domestic for crude oil. The recent development of the gas engine and the demand both for gasoline and refined lubricating oils; the withdrawal of large oil fields by the United States government for naval use, and the temporary curtailment of the output from the great oil fields in Mexico.

Under the present methods of mining coal in the lignite fields of this state a considerable per cent of the coal actually mined is too small for commercial use. This coal is separated from the larger lumps by means of screens and various types of washers and then thrown on a dump where it accumulates from year to year and is of no value to anyone. The possibility of using this product commercially in the form of pulverized fuel is now being explored and the results so far are very encouraging.

*Reprinted from the *Puget Sound Electric Journal*. Mr. Hull is superintendent of steam heat for the Puget Sound Traction, Light and Power Company.

The idea of burning powdered coal is not a new one, and in fact it was demonstrated twenty years ago that a very intense heat could be obtained in a furnace by its use. The necessity and means of very fine pulverization were not known at that time, and the blast effect of the fire produced by the high velocity of the air, necessary to keep the fuel in suspension, was disastrous to the brick settings of the furnace and the process was abandoned by engineers due to the difficulty of controlling and regulating the heat. In later years with the development of pulverizing machinery its use was again investigated and applied successfully to cement kilns, and metallurgical processes. Its use in locomotives, for the purpose of eliminating the smoke nuisance in terminals, has been demonstrated and is still in the experimental stage on a number of railroads. Its application to stationary boiler plants is the last field to be tried, and our own company with the assistance and co-operation of the Pacific Coast Coal Company are the pioneers in the investigation of its possibilities in the Pacific Northwest.

There are within a hundred miles of Seattle numerous coal mines with thousands of tons of fine coal piled up which at present is unmarketable and which should be available slightly above the cost of transportation.

This coal is a lignite variety particularly adapted to use in powdered form due to the high volatile constituent and the very high fusing point of the ash.

The foregoing characteristics are very important inasmuch as a high carbon coal requires a very fine pulverization and carefully designed furnace to maintain the high temperature until ignition is complete, and a low fusing ash will, when carried in suspension, cling to the tubes of the boilers, close up the flame space, and make its operation impossible.

To prepare this coal for burning it must first be thoroughly dried and moisture content reduced to approximately 1 per cent before it can be properly pulverized. It must then be pulverized to powder form where approximately 85 per cent will pass through a 200-mesh screen and 95 per cent through 100-mesh if the best results are to be obtained. It should then be fed directly to the furnace or if transportation or storage is necessary it should be kept air-tight so far as possible to prevent absorption of moisture. The danger from explosion when handling this material is eliminated, if it is kept in bulk and not allowed to become suspended in a mixture of air. In the latter

case a highly explosive atmosphere may be formed which will readily ignite if brought in contact with a flame.

The method of experiment and results of test made by this company are as follows:

The coal is dried and pulverized by the Pacific Coast Coal Company, at their briquetting plant, near Renton, which is equipped with a Raymond pulverizing plant. It is then loaded in a special car equipped for the purpose, which consists of a box car in which is constructed a metal lined hopper. The car is spotted at the steam plant over a chute which is connected to the car by a flexible hose and which feeds a small conveyor encased in a metal housing. The coal is elevated and dumped into a bunker, adjoining the power plant, from the bottom of which it is fed by means of two motor driven screens into the supply pipe. The coal is then blown through the pipe a distance of 30 feet to the front of the furnace where it feeds into specially constructed burners, made of sheet iron as shown in accompanying photograph. The air supply to each burner is furnished by a motor driven blower with dampers installed to control the supply. The boiler has been equipped with an extended oven, as shown in picture, in order to furnish sufficient space for the proper ignition and combustion of the fuel. The following is a record of a test on the equipment run continuously for 12.8 hours, the duration of the test being determined by the limited facilities for storage and handling of the fuel. The coal was weighed in the car as delivered to the plant and the net weight determined by a subsequent weight of the car after unloading. The test was run until all coal was consumed. The water was measured by a Venturi water meter installed in an individual feed line to the boiler, and all instruments were checked for accuracy before starting.

TEST OF 300 H. P., B. & W. BOILER

Burning Powdered Coal, March 23, 1917

COAL ANALYSIS

Moisture	Volatile	Fixed Carb.	Ash	Sulp.	B. T. U.
5.4	37.2	47	10.4	.56	11,760

ASH ANALYSIS

SiO ²	44
FeO	10.45
Al ² O ³	32.88
CAO	7.75
MgO	2.40

SCREEN TEST

On 100 mesh.....	5.8
Through 100 on 200.....	34.6
Through 200.....	59.6
Duration of test.....	12.8 hrs.
Average boiler h. p. developed.....	357
Total water evaporated.....	143,231 lbs.
Average temperature of feed water.....	185° F.
Average steam pressure.....	106.5 lb. gauge
Average temperature of steam.....	399° F.
Average flue gas temperature.....	528° F.
Average draft at uptake.....	.042" water
Average flue gas analysis.....	CO ² 17% Oxy 2% CO
Total Coal burned.....	18,389 lbs.
Actual evaporation per lb. of coal.....	7.8 lbs.
Equivalent evaporation from and at 212°.....	8.6 lbs.
Boiler efficiency.....	70%

It was noted during the test that the boiler could be forced to 200 per cent of rating without any apparent damage to brick setting or tubes. The stack was perfectly clear under these conditions, and there was no fusing of the ash. About one-third of the latter was found deposited in the second and third passes of the boiler.

The results of the experiment tend to refute most of the adverse criticism of this method of burning coal. There was no formation of slag in the furnace or on the tubes; there was no shower of cinders and ashes emitted from the smoke stack, and there was no damage done the boiler from heavy overload under these conditions.

From our experiments in burning both fuel oil and lignite coal it appears that the relative prices of the three fuels at which they would be equivalent in heating value are (assuming pea coal at \$1.60 per gross ton) as follows:

Pea coal on chain grates....	at 1.60 per gross ton, del.
Fuel oil.....	at 56 cents per bbl., del.
Powdered coal.....	at 2.20 per gross ton, del.

That the powdered coal can be burned without physical difficulty is practically assured, and the question now to be determined is "At what price can powdered coal be procured?" If the coal can be dried and pulverized at a cost of 35 cents per gross ton, including overhead charges on the investment which is the figure submitted by some manufacturers, the question

depends upon the price which must be paid the mines for their product. This very vital feature has not yet been determined, and until such time as this feature and the exact operating and fixed cost of the pulverizing mill have been determined the question as to what change will be made in the Western avenue steam plant, where the market price of fuel oil is becoming prohibitive, will remain unanswered.

If, by our experiments we are able to prove the feasibility and economy of burning our lignite coals in powdered form, there will undoubtedly be created a large market for it both in stationary and marine practice. A lively interest is being taken in our work by all large consumers and producers of fuel in this territory, as well as by the University of Washington and the Government Bureau of Mines who have offered and rendered all assistance possible. We hope that within a few months the success of our efforts will have been finally demonstrated and that we may be the means of introducing the practice of burning powdered coal under stationary and marine boilers in the Pacific Northwest.

SEATTLE M. O. A FINANCIAL FAILURE*

The Municipal Street Railways of Seattle started to operate about June 1, 1914, completing two and one-half years of operation on January 1, 1917, and during this period have shown heavy financial losses.

There are two separate lines known as divisions "A" and "C." Division "A" is within the city limits, is approximately four and one-half miles long and consists of three and one-half miles double and three-quarters of a mile single track. Division "C" was a gift to the city from speculators who built the line at a cost of \$116,000 to sell real estate and finding the property a heavy burden presented it to the city. It is approximately eight and one-half miles long, four and one-half miles lying within city limits and four miles outside. Divisions "A" and "C" are widely separated—about three miles apart and in opposite ends of the city—Division "A" in the North and "C" in the South end.

The City Utilities Department of Seattle has charge of the operation of these railways, and from the reports of that department including the year 1916, and the 1915 report of the Washington State Bureau of Inspection and Supervision of Public Offices, the following figures have been compiled:

YEAR	Earnings	Expenses	Bond interest	Depreciation
1914 (7 Mos.).....	\$21,590 33	\$27,808 64	\$7,875 00	.....
1915.....	35,305 14	51,025 61	17,718 75	\$8,233 23
1916.....	46,079 36	56,171 91	19,125 00	13,739 83
	\$102,974 83	\$135,006 16	\$44,718 75	\$21,973 06
Operating expenses, two years seven months			\$135,006 16	
Earnings	"	"	102,974 83	
Loss from operation	"	"	.....	\$32,031 33
Bond interest	"	"	.....	44,718 75
Depreciation	"	"	.....	21,973 06
Total loss.....				\$98,723 14

Total of Losses to Community

The loss shown above is exclusive of interest on borrowed funds, taxes, overhead charges of any kind, accounting and legal

*Reprinted from *Aera* (organ of the American Electric Railway Association) for April, 1917.

expense, and therefore does not represent the total loss to the community. The following figures indicate more fully the loss:

Total loss shown above.....	\$98,723.14
Accounting and Utility Department Service, two years seven months.....	3,000.00
Lost taxes, two years seven months.....	21,083.64
Interest on borrowed funds, two years seven months.....	4,627.74
Lighting Department loss on power, two years seven months.....	29,122.45
Loss of two per cent of gross receipts, two years seven months.....	2,059.50

Total loss to taxpayers..... \$158,616.47

The authority for the charge of \$3,000 for accounting and services of the Utility Department is based on the criticism of the State Bureau of Inspection and Supervision of Public Offices in its report for the year 1915 as follows:

No part of the payroll of the Public Utility Department, which has direct charge of the street railway, supervise and keep all its accounts, is charged to operating expense but all such accounting and general expense is paid out of the general fund of the city. At a very conservative figure \$1,200 per year to cover accounting and general overhead supervision expense, should be borne by the Street Railway.

Lost Taxes \$21,000

The item of lost taxes, \$21,083.64, is based on the construction account of \$474,276.24 less accumulated depreciation of \$21,973.06 and 45 per cent of this balance taken as the assessable value, subject to the average tax rate levied during the past two and one-half years.

Sundry sums of money were borrowed from the general and interest funds raised by taxation and used to pay construction, operating expenses and bond interest, the total of which amounted to \$92,554.79 on January 1, 1915. Interest on this amount is figured at 5 per cent for one year amounting to \$4,627.74 although the accumulated interest on borrowed funds for the entire period of two and one-half years would be greater. The State Bureau of Inspection in its report for 1915 says:

Inasmuch as the general fund is on a warrant basis and is paying 5 per cent interest on outstanding warrants,

the same rate of interest on the above loan is properly chargeable to the Street Railway.

At the end of 1916 the railway had borrowed from the general and interest funds a total of \$111,679.79.

Power at Less Than Cost

The State Bureau of Inspection in its report for 1915 after analyzing the cost of production of power by the Municipal Lighting Department, found that the Lighting Department was furnishing power to the railway at less than its cost, and in its auditing report of the street railway accounts, states that "The Municipal Lighting Department is furnishing power for the operation of the street railway at \$.0124 cents per K. W. H., being \$.0123 cents less than production cost. In 1915 . . . this shows a Lighting Department loss of \$11,648.98 . . ." The daily consumption of power for 1914 and 1916 was somewhat greater than in 1915, but the figures showing this loss for two and one-half years are based on the 1915 loss which if anything, is low and amounts to \$29,122.45.

The item of two per cent of the gross receipts is shown as a loss because that is the franchise tax required of the private railway company operating in Seattle.

How Losses Are Settled

So far, the general fund of the city has been burdened with the losses of the street railways and no tax levy has been made to cover the amount. Sometime in the future the losses will be provided for in a levy and the general fund repaid. All the revenue of the railways is practically disbursed in paying wages, and the receipts are hardly sufficient to meet these, the balance of cash required for operating supplies being provided through loans from the general fund, while the Lighting Department has not received one cent in cash for the power supplied to date but has been forced to furnish a credit to the Railway Department in payment for power furnished, through the transfer of the railway substations to that department.

Law Was Violated

Concerning the transfer of substations to the Lighting Department, the State Bureau of Audits, has this to say:

Under Ordinance No. 35476, which was vetoed by Mayor Gill and then passed over his veto, the Council

transferred the Lake Burian and Aloha street substations, which were constructed and equipped by the Street Railway out of the proceeds of a railway bond sale, at a cost of \$60,527.85 to the Lighting Department for a consideration of \$55,000. This amount is to be paid in power to be furnished the Street Railway for operating purposes. In other words, \$60,527.85 being part of the bond money voted by the people for railway construction purposes is being used for operation. *This we believe to be contrary to law.*

Prosperity Far in Future

A. L. Valentine, Superintendent of Public Utilities, in charge of the operation of these lines in a report dated May 27, 1916, to the City Council in response to a resolution of that body requesting an estimate of how long it would take to make the Municipal railway a profitable investment, stated in substance that, "Assuming that the methods of urban transportation are not revolutionized in the interval and Division 'A' is extended into Ballard, and the cost of operation is maintained and other details remain the same as at present, the city line might pay a profit at the end of twenty-three years, if Seattle continues to operate it that long."

As regards Division "C" the report states: "Division 'C,' as at present operated, would not, in my judgment, even taking into account the freight hauling possibilities, earn per annum an amount equal to the operating expenses prior to 1926."

The report further adds: "The tendency of all costs has mounted steadily upwards, while the fare has remained the same, and more recently the competition of gasoline motor vehicles, both public and private, has made heavy inroads into the revenues."

JAMES CHADBOURNE WOODSOME

BY HARRY H. HUNT

The death of James Chadbourne Woodsome, manager of the Tampa Electric Railway Company, occurred at his home in Tampa, Fla., April 18, 1917. Mr. Woodsome was born in Boston, Mass., June 27, 1877, and was graduated from the Massachusetts Institute of Technology in 1901. In 1901-2, he was an assistant instructor in that institution and then entered the Stone & Webster organization. From 1902 to 1906, he was in the Boston office. In 1906, he became superintendent of the Houghton County Electric Light Company. In August, 1906, he was appointed general superintendent of the Dallas Electric Light & Power Company, and in 1911 was made manager of the Tampa Electric Company.

Although he went to Tampa a comparative stranger, he rapidly became identified with the various community activities, to which he contributed his time and energy without stint. An extract from the editorial page of one of the leading Tampa daily papers indicates the high regard in which he was held by the community:

"He was a citizen in the larger sense of the word; one whose influence was felt in all civic movements; personally modest yet powerful in action; a man of the type which Tampa needs."

Mr. Woodsome possessed a kindly and sympathetic disposition, uniformly courteous and gentle. He was ever ready to lend a hand to those in trouble. His loyalty and integrity were as an inspiration to his subordinates. One of the younger men connected with the Tampa Electric Company expresses the feeling of the members of that organization in the following words:

"With the passing of Mr. Woodsome every individual employee of our company feels the loss of a personal friend. Those of us who have had the privilege of knowing him intimately and coming in contact with him in our work have been inspired by his energy, strengthened by his sympathy and guided by his liberality and breadth of mind. We are better for having known him and we mourn the loss of a true friend whom God in his judgment has taken from us."

Those who have had an opportunity to observe some of the

more intimate relations of his family life must have been impressed with its serenity. His constant consideration for those around him, his deep affection for his little daughter and her devotion to him were beautiful to behold.

He passed through the last months of his life under most trying conditions with a characteristic spirit of determined optimism and remained to the last patient and cheerful.

THE STONE & WEBSTER LIBERTY LOAN CLUB

The men, women and boys at 147 Milk street formed a Stone & Webster Liberty Loan Club on May 14, 1917. They desire that every member of the organization connected with the Boston office shall become a member.

The only qualification for membership is the ownership in whole or in part of one or more bonds of the Liberty Loan.

The purpose of the club is to get 100 per cent of the Boston organization to subscribe to the Liberty Loan. It is hoped that every member will, besides subscribing himself or herself, strive to induce friends and acquaintances outside of the organization to go to the nearest bank or broker and put as much money as possible into the loan.

They hope that a similar Liberty Loan Club will be formed in every one of the companies operated by Stone & Webster, each with 100 per cent membership and 100 per cent enthusiasm.

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The managers of the companies operated by Stone & Webster write to the Management Division of Stone & Webster about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Amsterdam, N. Y., April 13th:

Bank clearings for March, 1917, were \$1,520,870, against \$2,147,585 last year.

Post office receipts for March, 1917, were \$6,765, against \$7,486 last year.

Labor continues to be the only factor that is limiting the output of the various factories here. Retail trade is quite brisk in all lines, but building operations are confined almost exclusively to large structures, and the contractors look for but little building this summer.

Ballston Spa, N. Y., April 13th:

Bank clearings for March, 1917, were \$273,895, against \$264,230 last year.

Labor conditions seem to have settled somewhat in this locality and local conditions seem to be very bright for the future.

Baton Rouge, La., April 21st:

Building permits for March, 1917, were valued at \$22,974, against \$40,162 last year.

Post office receipts for March, 1917, were \$6,051, against \$5,252 last year.

The average number of employees of the Standard Oil Company in March, 1917, was 2,490, against 2,219 last year.

The present war conditions seem to have had scarcely any effect as yet on business conditions in Baton Rouge, as March was very much in line with preceding months.

Our railway earnings for March, 1917, showed an increase over the preceding year. The same is true of our light and power earnings and our gas earnings.

Beaumont, Tex., April 16th:

Bank clearings for March, 1917, were \$5,160,754, against \$3,986,180 last year.

During March, 1917, 75 building permits were issued, valued at \$108,309, against 81 last year, valued at \$89,749.

Post office receipts for March, 1917, were \$10,390, against \$9,773 last year.

The business outlook for Beaumont and vicinity is exceptionally

good. The city is making many extensions and improvements to its properties, and several residences, large buildings, warehouses, etc., are under construction. The Texas Steel Company, a corporation with a capital stock of \$2,500,000, made up of influential business men of this community, has purchased a site on the outskirts of Beaumont and the surrounding property has been divided into city lots, which will be sold at auction at reasonable prices for rapid disposal. It is believed that there is an immense opportunity for the development of one of the greatest industries in the Southwest.

During March, the Beaumont Iron Works made an extension to their plant at an expenditure of approximately \$50,000. This included the installation of an electric furnace, in connection with which we have closed a contract to furnish electric power.

The Beaumont Municipal docks are nearing completion. All electrical apparatus has been ordered and our extensions to take care of their demand have been made.

Brockton, Mass., April 9th:

Bank clearings for March, 1917, were \$13,209,550.

The deposits of the Brockton Savings Banks in March, 1917, were \$14,784,184, against \$13,429,906 last year.

Post office receipts for March, 1917, were \$25,306.

During March, 1917, 43 building permits were issued, valued at \$46,280, against 34 last year, valued at \$44,285.

Shoe shipments for March, 1917, were 65,578 cases, against 84,651 cases last year. For the first three months of 1917, there were 189,180 cases, against 207,923 cases last year.

The W. L. Douglas Shoe Company is contemplating enlarging their number 1 factory building in order to provide additional floor space for the cutting, lasting and treeing departments. It recently shipped by registered mail two orders of about 2,500 pairs of civilian shoes to Vladivostok, Siberia. It is understood that the George E. Keith Company is shipping large quantities of shoes to France and Italy by registered mail every month.

A big modern store and office building erected by the Kennedy Clothing Company is now completed.

According to a recent statement by the State Bureau of Statistics, Brockton's population is 62,288, of which 44,579 are native born and 17,709 are foreign birth.

Canton, Mass., April 7th:

General business conditions are good, although there has been a slight falling off in the cotton and woolen industries in the past month.

A few houses are being erected in the Pond street district in Canton.

The Plymouth Rubber Company's addition is nearly completed.

Dallas, Tex., April 5th:

During March, 1917, 100 building permits were issued, valued at \$1,002,195, against 177 last year, valued at \$452,891.

Real estate transfers for March, 1917, were \$1,823,289, against \$2,476,572 last year.

Post office receipts for March, 1917, were \$129,898, against \$118,114 last year.

Reports from various sources indicate a heavy spring business by the Dallas wholesale and retail trade. The International crisis has tended to make buyers from the surrounding territory more conservative. But with delivery so uncertain and prices generally of an upward trend, the orders now coming in are not only for immediate requirements but also cover probable demands for some little time to come. Despite the war possibilities, Dallas seems to have entered an era of prosperity exceeding any similar period in the city's history.

The prevailing opinion among representative business men seems to be that, in view of the higher price of cotton and farm products in general, business is going to be especially good during the next few months. There seems to be little or no apprehension regarding the result of our being at war with Germany; in fact, the feeling is that war will help rather than retard the business situation.

Agricultural conditions throughout the Eleventh Federal Reserve Bank district are good, according to a recent survey made by the Dallas bank. Drougths that have been a source of worry in some sections have been effectually broken, while damages from frost have been largely, if not wholly, offset by general demand and higher prices.

Substantial increases were made in the earnings of both the railway and lighting departments during the month of March.

Everett, Wash., April 6th:

During March, 1917, 49 building permits were issued, valued at \$12,-632, against 65 last year, valued at \$18,788.

Post office receipts for March, 1917, were \$6,700, against \$5,980 last year.

The situation, so far as the supply of cars for the movement of lumber and shingle products is concerned, has not improved. Local mills are not getting more than 25 per cent of their requirements in cars, and many are not getting anywhere near that quantity. Some of the shingle mills are practically closed down for this reason. It is estimated that 35,000 cars will be required to fill the orders for lumber now standing on the books of Coast mills. Some of the mills are of the opinion that the shortage will be relieved in the near future, but this seems to be based largely on hope alone. Prices are good, viz., from \$1.00 to \$1.50 higher than a year ago.

Fall River, Mass., April 9th:

Bank clearings for March, 1917, were \$7,087,011, against \$7,097,393 last year.

During March, 1917, 51 building permits were issued, against 39 last year

Post office receipts for March, 1917, were \$15,337, against \$15,432 last year.

The cotton cloth sales for the last four or five weeks have been very large and the mills are well sold ahead.

The gas sales for March showed a fair increase and the prospects are that this increase will continue. The sales of gas appliances continue large.

Fort Madison, Ia., April 6th:

Bank clearings at Fort Madison for March, 1917, were \$1,605,932, against \$1,516,527 last year.

Post office receipts at Fort Madison for March, 1917, were \$2,278, against \$1,932 last year.

Business conditions in Fort Madison were satisfactory during March. Most of the merchants report a slight increase in business over the same period of 1916 and all seem to be optimistic regarding the future. The Santa Fe Railroad, whose main line passes through this city, continues to move an exceptionally large amount of freight, and it is not unusual to see many of its freight trains double-headed. The shop forces of the Santa Fe are not adequate and additional men will be placed on payrolls whenever they can be obtained.

Practically all of the industries of Fort Madison are working to full capacity, and in several cases the output is not sufficient to take care of the demands.

Considerable building is looked for during the coming months.

The business of the Fort Madison Electric Company continues to show an increase.

Bank clearings at Dallas City for March, 1917, were \$427,510, against \$305,555 last year.

Post office receipts at Dallas City for March, 1917, were \$392, against \$376 last year.

Business conditions in Dallas City continue about the same. Merchants feel optimistic regarding their spring and summer business. The Burg Carriage Company states that it has more unfulfilled orders at present, which is the busiest time of the year for its line, than at any similar period in the last few years.

Fort Worth, Tex., April 9th:

Bank clearings for March, 1917, were \$50,016,780, against \$36,596,771 last year.

During March, 1917, 82 building permits were issued, valued at \$485,520, against 121 last year, valued at \$202,992.

Post office receipts for March, 1917, were \$49,634, against \$44,949 last year.

The receipts at the stockyards in March, 1917, were as follows: cattle, 84,859, against 53,364 last year; calves, 7,387, against 4,861; hogs, 159,241, against 129,458; sheep, 24,244, against 24,410; horses and mules, 4,204, against 4,980.

The month of March was an active one in many lines of business owing to the Annual Fat Stock and Horse Show, March 10 to 17. The scope of the show has been enlarged from year to year and the attendance this year was the largest on record. The annual convention of the Texas Cattle Raisers Association was held here the same time.

Our railway receipts for March, 1917, showed an increase of 21 per cent over last year, due to improved business conditions, the absence of

jitney competition, and the larger attendance at the Fat Stock and Horse Show.

It is reported from Cleburne that a new picture theatre has been completed during the past month and that other new buildings in the business section are contemplated. Agricultural conditions in the territory surrounding Cleburne are excellent.

Earnings of the Tarrant County Traction Company for March, 1917, show an increase of 14 per cent over last year.

Galveston, Tex., April 5th:

Bank clearings for March, 1917, were \$19,908,260, against \$17,457,715 last year.

The volume of business done in March, 1917, was \$100,748,000, against \$94,863,000 last year and \$93,611,000 in 1915 and \$85,045,000 in 1914, and \$81,753,000 in 1913.

During March, 1917, 111 building permits were issued, valued at \$11,739, against 177 last year, valued at \$180,942.

Post office receipts for March, 1917, were \$15,970, against \$15,799 last year.

During the past month, only 44,204 bales of cotton were shipped from this port as against 119,499 bales a year ago.

Wheat exports during March, 1917, were 1,457,128 bushels, against 2,600,260 bushels last year.

The embargo on inbound freight continued throughout last month, but we understand it is to be lifted on all the railroads very shortly. This should signify that the congestion at the docks and terminals has been satisfactorily reduced. There is also hope that it means that the railroad authorities are looking for sufficient cargo space in the near future to handle freight consigned to foreign and coastwise ports.

Glens Falls, N. Y., April 13th:

Bank clearings for March, 1917, were \$1,018,974, against \$757,961 last year.

Building permits for March, 1917, were valued at \$11,850, against \$2,500 last year.

Post office receipts for March, 1917, were \$6,447, against \$5,344 last year.

Although the retail trade shows its usual seasonal decline, manufacturing industries are very active, many of them continuing to work day and night.

The Chamber of Commerce is making every effort to attract new industries to this locality.

Haverhill, Mass., April 16th:

The deposits of the Haverhill Savings Banks on March 31, 1917, were \$14,132,587, against \$13,202,557 last year, an increase of 7.05 per cent.

During March, 1917, 1 building permit was issued, valued at \$6,000, against 12 last year, valued at \$25,700.

General business conditions continue good.

Houston, Tex., April 10th:

Bank clearings for March, 1917, were \$47,857,635, against \$48,858,365 last year.

During March, 1917, 225 building permits were issued, valued at \$197,166, against 334 last year, valued at \$169,432.

Real estate transfers for March, 1917, were \$923,885, against \$2,305,-162 last year.

Post office receipts for March, 1917, were \$48,694, against \$53,625 last year.

General business conditions in Houston and the surrounding country show no pronounced improvement over a month ago. All branches of business seem to be holding their own in face of the disturbed conditions created by the war situation. The jobbing trade was reported good in March. Retail trade was fair. Manufacturing interests have been very active. The car shortage is retarding the movement of lumber somewhat. At the moment, the farmers in this vicinity are in need of rain.

The receipts of the Houston Electric Company for March, 1917, showed a gain of 11.86 per cent over the previous year.

Keokuk, Ia., April 6th:

During the past month, general business conditions have shown great improvement over the months immediately preceding, especially among the retail trade. This increase no doubt has been due to the unusually fine weather which we had during the month of March. It has brought a great many people from the outlying districts into the city.

The past month was the warmest March since 1911, the mean temperature being 41 degrees.

The outlook for the coming year is exceedingly good. A number of new buildings are in process of construction, and during the first three months of this year the value of building permits was greater than for the years 1914, 1915 and 1916 combined.

Key West, Fla., April 4th:

Post office receipts for March, 1917, were \$2,074, against \$1,927 last year.

Customs receipts for March, 1917, were \$58,247, against \$38,593 last year.

The cigar output for March, 1917, was 6,410,140 cigars, against 3,740,380 cigars last year.

The largest cigar factories have operated with reduced forces throughout the month, owing to a falling off in orders. The factories are importing tobacco in very conservative quantities and are not anticipating their output very far ahead.

Lowell, Mass., April 10th:

Bank clearings for March, 1917, were \$4,677,576, against \$4,038,250 last year.

During March, 1917, 56 building permits were issued, valued at \$71,065, against 40 last year, valued at \$67,455.

Post office receipts for March, 1917, were \$17,433, against \$16,941 last year.

The prosperous business conditions in Lowell and vicinity have not been affected by the war. Manufacturers are still working under heavy orders and the general prosperity among industries continues to keep mercantile trade stable.

Our company continues to increase the number of its power customers and has also secured many new residence lighting customers, about 50 per cent being old houses wired as a result of our house-wiring campaign. Income from the sale of appliances continues to show a very satisfactory increase over last year.

Oneida, N. Y., April 13th:

Bank clearings for March, 1917, were \$573,951, against \$387,740 last year.

Post office receipts for March, 1917, were \$3,720, against \$3,028 last year.

Retail merchants report an unusually large volume of business for the month of March. Oneida manufacturers are not able to fill their orders at the present time owing to scarcity of labor. Thus far the war conditions have not produced any apparent change in conditions in this neighborhood.

Paducah, Ky., April 4th:

Bank clearings for March, 1917, were \$5,158,924, against \$3,524,571 last year.

The very satisfactory increase in bank clearings is undoubtedly due in large measure to the tobacco industry, as high prices still continue.

The branch plant of the American Cigar Company has just started with a force of approximately 75 girls. It is confidently expected that the working force will be considerably increased in the very near future and it is believed that ultimately 500 girls will be employed. The Industrial Committee of the Board of Trade is entirely responsible for securing this factory and it is believed that the organization will continue its campaign for new industries with increasing vigor.

Pawtucket, R. I., April 3rd:

The banks report an increase of 23 per cent in commercial accounts in March and an increase of 16 per cent in savings accounts.

During March, 1917, 13 building permits were issued, valued at \$68,800, against 20 last year, valued at \$51,850.

Post office receipts for March, 1917, were \$13,854, against \$13,939 last year.

General business is as active as ever. The war possibilities seem not to have affected conditions adversely, manufacturers as a whole having some time ago adjusted themselves to the idea of war. Producers and dealers in cottons and woolens look for great activity on account of the war. A shortage still exists in raw material and labor, and undoubtedly the creation of an army of 2,000,000 or more will increase the difficulties of the manufacturers.

The textile mills are running to their capacity, and many, if not all, are sold out for months to come. One of the larger mills first in connection with the making of military garments received an order for five thousand pieces of cheap sateen to be used for coat linings.

The iron and steel industry is very busy, with sufficient orders to keep the mills moving for six months or a year to come. Retail merchants report an excellent volume of business in March over a year ago, amounting to 25 per cent increase.

Pensacola, Fla., April 6th:

Post office receipts for March, 1917, were \$8,151, against \$7,710 last year.

Exports for March, 1917, were \$337,122, against \$216,021 last year.

There has been no change of importance in the general business situation. The outlook is regarded as very satisfactory. Both our railway and lighting receipts for March, 1917, showed an increase over last year.

Plymouth, Mass., April 6th:

The deposits of the Plymouth Savings Banks on March 31, 1917, were \$2,634,798, against \$2,490,365 last year.

Post office receipts for March, 1917, were \$4,108, against \$3,740 last year.

General business conditions were very satisfactory during March. The mills of the Plymouth Cordage Company were running both night and day and all the small tack factories were working to capacity. The Puritan mill of the American Woolen Company and the Standish Worsted Company's mills were operating on about half time.

Considerable work was done on buildings along Main street in connection with the widening of the street.

Retail business was fairly brisk.

Ponce, Porto Rico, April 16th:

During March, 1917, 1 building permit was issued, against 4 last year.

Post office receipts for March, 1917, were \$2,306, against \$2,182 last year.

The March coffee shipments were 1,860,715 pounds, valued at \$265,898. The sugar shipments were 12,142,785 pounds, valued at \$624,337. The tobacco shipments were valued at \$91,280.

It is difficult to state what effect the recent developments in the war situation will have on Porto Rico. At present, prices are high, and business good. At this season of the year there is always more money in circulation among the laboring class, as it is at the end of both coffee and sugar exports.

Port Arthur, Tex., April 14th:

During March, 1917, 69 building permits were issued, valued at \$144,795, against 66 last year, valued at \$55,864.

Post office receipts for March, 1917, were \$3,745, against \$2,823 last year.

Exports (Sabine District) for March, 1917, were \$2,632,398, against \$2,080,446 last year.

Imports (Sabine District) for March, 1917, were \$198,832, against \$115,795 last year.

Custom house receipts for March, 1917, were \$5,977, against \$2,529 last year.

The general business outlook for the immediate future is considered good.

Weather conditions the past month have been favorable for the planting of rice and other crops.

Saratoga Springs, N. Y., April 13th:

Bank clearings for March, 1917, were \$293,333, against \$262,844 last year.

Post office receipts for March, 1917, were \$4,685, against \$5,799 last year.

General business conditions in this community are about normal. There was practically no activity in the building line during March.

Savannah, Ga., April 12th:

Bank clearings for March, 1917, were \$23,400,346, against \$22,739,674 last year.

During March, 1917, 35 building permits were issued, against 112 last year.

Post office receipts for March, 1917, were \$28,065, against \$23,427 last year.

Cotton receipts for March, 1917, were 14,830 bales, against 51,372 bales last year.

Turpentine receipts for March, 1917, were 1,159 barrels, against 1,430 barrels last year.

Resin receipts for March, 1917, were 7,974 barrels, against 12,171 barrels last year.

Business conditions continue to show good improvement though cotton is not moving at all owing to lack of foreign bottoms. The sugar refinery is practically completed and the first cargo of raw sugar is expected on May 1. The pulp mill is well under way.

Our railway department showed a good gain in March over the previous year. The light and power department showed a good increase and the condition of the manufacturing interests is reflected in our large increase in wholesale power earnings.

General conditions in this section of the South continue prosperous. Labor is well employed, and as a larger number of negroes are going off every day a labor shortage is feared. The long stretch of unseasonably cool weather has evidently been broken and the market gardens are beginning to get back into shape.

Seattle, Wash., April 12th:

Bank clearings for March, 1917, were \$87,468,576, against \$64,991,761 last year.

Building permits for March, 1917, were valued at \$583,795, against \$735,785 last year.

Real estate transfers for March, 1917, were \$1,141,328, against \$874,546 last year.

Domestic exports for March, 1917, were \$6,239,427, against \$4,364,461 last year, and foreign exports were \$7,774,063, against \$5,899,267 last year.

Domestic imports were \$6,853,101, against \$4,676,675 last year, and foreign imports were \$22,448,305, against \$11,146,730 last year.

Shipbuilding and allied industries kept general business at a higher level during March, despite a reduction in flour mill operations due to lack of wheat.

Labor has never been so fully employed as at present and the demand for shipyard labor is drawing men from the interior towns of the state.

The lumber business is still hampered by lack of shipping facilities.

Sydney, Nova Scotia, April 9th:

During March, 1917, 12 building permits were issued, valued at \$22,088, against 2 last year, valued at \$1,435.

Customs receipts for March, 1917, were \$34,777, against \$21,459 last year.

The output of the Dominion Coal Company for March, 1917, was 341,533 tons, against 379,266 tons last year. The shipments were 223,500 tons, against 269,084 tons last year.

As noted above, building operations are fairly active. It is expected that the coming season will see a considerable number of new residences erected, in spite of the high cost of material and labor. This will tend to relieve somewhat the housing problem, which for months past has been very acute owing to the curtailment of construction during the past three years and to a considerable influx in population as a result of industrial prosperity.

Conditions in the steel and coal industries remain unchanged.

The Nova Scotia government has voted \$2,000,000 as an aid to shipbuilding in the Province. A citizens' committee has been formed to induce some company to start a shipbuilding plant in Sydney. Some years ago, the city voted a bonus of \$1,000,000 to any company which would start such a plant. Though the period in which to obtain this bonus has expired, it is believed that the city will render such assistance as is within reason to any new company which may undertake the project. Sydney Harbor offers great advantages for such a plant, owing to the proximity of two large steel plants and the large collieries operating on both sides of the harbor.

Tacoma, Wash., April 10th:

Bank clearings for the first three months of 1917 were \$31,304,430, against \$25,373,089 last year.

During the first quarter of the year, 324 building permits were issued, valued at \$265,077, against 346 last year, valued at \$308,799.

Post office receipts for the first quarter of 1917, were \$72,434, against \$67,833 last year.

Mr. W. H. Todd, president of the Todd Dry Dock & Construction Company, recently made a trip from New York to Puget Sound to inspect Seattle and Tacoma properties of his company. The company has purchased 100 acres of tide flats property and the work of filling in the site of the new plant has progressed so rapidly that it is estimated that within two months the actual construction of buildings will be begun. While in Tacoma, Mr. Todd stated that actual building of the ocean liners already contracted for will be begun in July, and that the plant will construct seven steel freighters, six of them for the Cunard Steamship Company and one for the Barber Steamship Company of New York.

Through the efforts of the Tacoma Rotary Club, the Tacoma Industrial Development Association has been organized, with well known Tacoma business men in charge. The purpose of the organization is to furnish capital to local industries needing financial aid and to bring together small investors who are not in position properly to investigate an investment offered. A guarantee fund of \$100,000 has been raised by the Tacoma Rotary Club.

Tampa, Fla., April 11th:

Bank clearings for March, 1917, were \$5,622,452, against \$4,688,677 last year.

Building permits for March, 1917, were valued at \$142,635, against \$116,245 last year.

Post office receipts for March, 1917, were \$23,598, against \$21,044 last year.

Customs receipts for March, 1917, were \$187,988, against \$155,822 last year.

Internal revenue receipts for March, 1917, were \$89,241, against \$81,218 last year.

The value of water commerce for March, 1917, was \$2,755,801, against \$3,095,970 last year.

Cigar manufactures for March, 1917, were 28,954,000 cigars, against 30,280,000 last year.

Nothing of special importance occurred in connection with the general business situation last month.

Our railway receipts for March, 1917, showed an increase of 12 per cent over the previous year, and our lighting receipts an increase of 6.58 per cent.

The Export Railway Company has announced plans for terminals at South Tampa on the eastern shore of Hillsborough Bay, about six miles from Tampa. A fifteen-mile railroad is projected from the mines in Hillsborough County (Bloomingdale), owned by the American Phosphate & Mining Company, to South Tampa, and the phosphate drying plant and elevators, together with a fertilizer factory, are planned for erection at the water terminals.

The Tampa Shipbuilding & Engineering Company (formerly the Tampa Foundry & Machine Company) is now engaged in preliminary work on two 3,500-ton ocean steamships. The "Poughkeepsie," the first steel hull vessel to be built here (2,000 tons), is about completed and has satisfactorily met all tests of construction.

Watervliet, N. Y., April 13th:

During March, 1917, 3 building permits were issued, valued at \$7,000.

Post office receipts for March, 1917, were \$2,081, against \$1,643 last year.

All factories are running about normal, and those manufacturers who are fortunate enough to have sufficient raw material on hand find their product limited only by scarcity of labor.

Woonsocket, R. I., April 12th:

The mercantile business is in excellent condition, much above normal for March.

Textile mills are running full time, though there is a little uncertainty as to government requirements and consequently some reduction in orders taken.

News from the Companies

Boston Office

Mr. Howard L. Rogers has been in Washington lately.

Mr. W. H. McGrath, vice-president of the Puget Sound Traction, Light & Power Company, has been here for a short time.

Mr. L. C. Bradley, district manager of the Texas companies, was also here for a short time.

Mr. H. T. Edgar has returned from a trip to the central west.

Mr. L. R. Nash has returned from Texas.

Mr. George A. Campbell, manager at Reno, Nev., was here for a short time.

Mr. R. C. Brooks, superintendent, Dallas Electric Light & Power Company, made a short visit to the Boston office.

Mr. C. C. Allen was recently here from El Paso, as was also Mr. J. B. Townsend from Houston, Tex.

Mr. Edward T. Esty of the statistical department has gone to New London.

Mr. Walter J. Henry, Massachusetts Institute of Technology 1918, has entered the statistical department.

The following men have left for military service:

G. H. Balch	W. J. Kelly
Carleton Burr	J. P. Lane
F. C. Carleton	L. C. Pond
G. G. Corregan	M. H. Richardson
W. T. Crawford	E. H. Rogers
J. M. Dee	W. G. Ryan
R. L. Eddy	J. C. Trumbull
S. M. Hurd	G. L. Weymouth

Baton Rouge, La.

Construction work has been started on the new city school buildings. Two large brick buildings for white pupils and one for colored children are to be completed as early as possible, and an addition to the Asia Street School is included in the new work for school improvement. These buildings will be finished and ready for use at the beginning of the next session, and will relieve the congestion at present existing in the city schools and give comfortable quarters for all the school children of the city for several years to come. The cost of these school improvements will be about \$125,000.

The Baton Rouge Sanitarium, which operates under the management of the Charity Ward Association of this city, has moved into its new quarters at the corner of Government street and East Boulevard. New buildings have been added to this property and very comfortable and sanitary accommodations are now available.

A Ford plant to cost between \$25,000 and \$30,000 will be built in Baton Rouge within a few months, is the report given out by the Baton Rouge Motor Company, Inc. Temporary quarters have already been

put into shape and construction will begin on the new building as soon as a suitable location is procured. The plans of the new building show that the two-story structure will have 16,000 square feet of floor space and many attractive features, including show-rooms, ladies' rest room, stock room, office and garage.

The river is just reaching the high stage at Baton Rouge, but as the levees are in first class condition no trouble is anticipated this year. The city has permanently installed an 18-inch centrifugal pump at the dyke to lower the level of the University Lake in case of heavy rains during high water which would overflow property at the north of the city. The pump is driven by electric motors, for which current is supplied by the Baton Rouge Electric Company. This permanent installation will cut down the large annual expense of the makeshift arrangements used in previous years.

The Standard Oil Company of Louisiana recently announced its intention of allowing every employee of six months' standing, who entered service of the national guard, his full pay less his army pay up to July 1, 1917. After July 1 men having dependents will receive 50 per cent, and those without dependents 25 per cent of their full pay.

Mr. H. R. Sharpless, formerly of Woonsocket Electric Company, has been transferred to this company as chief engineer of power station.

Mr. L. N. Howell, former chief engineer, has accepted a position in the power station at Maryville, Tenn.

Mr. F. C. Taylor has been transferred to Tampa, Fla., where he will act as assistant chief engineer.

Beaumont, Tex.

Considerable construction work is in progress and is contemplated for the future, on the part both of the local companies and of other interests in this territory, which is indicative of the growth and expansion of the companies and the community in which they operate.

A substantial addition is being erected to the Port Arthur power station by the Engineering Division, which will house a new 4,000 kilowatt turbo-generator. This construction was necessary in order to take care of increased business.

To provide for the most efficient utilization of power station investment at Port Arthur and Beaumont, and as a matter of insurance in the event of trouble with generating apparatus at either station, a tie line of No. 0 copper is being constructed.

The Engineering Division is constructing for the Jefferson County Traction Company a terminal building at Port Arthur, which will also contain offices for the Port Arthur Light and Power Company and the Jefferson County Express Company.

Considerable progress is being made in the construction of the municipal docks and warehouses at Beaumont, for which we shall furnish the power and lighting.

A contract will be closed shortly with the Beaumont Iron Works, covering a supply of power to operate a 400 kilowatt furnace.

Plans are under way for the construction of a ship yard, for which it is anticipated we shall secure the power load of approximately 100 kilowatts.

A considerable number of prominent local business men are interested

in the financing and erection of a steel plant on the outskirts of Beaumont. The matter looks very promising at the present time, as the stock has been practically all subscribed for and as the corporation owns considerably valuable ore lands in this state. This project demonstrates the progress of the city of Beaumont, and its desire to develop by means of diversified industries.

Mr. E. J. Davis of El Paso has assumed the position of claim and purchasing agent left vacant by the death of Mr. R. E. Griffiths.

On the 10th of the month, Mr. Townsend gave a very enjoyable dinner to department heads of the Beaumont and Port Arthur companies, at which Mr. W. E. Orgain, the companies' attorney, and Mr. W. E. Hawke and Mr. H. Dayton, auditors, who are at present auditing the books of the companies, were also present. The object of the meeting was to promote acquaintance and enhance the spirit of co-operation among the departments. Matters pertinent to the organization were discussed; the chief topic being the war with Germany.

During the month a flotilla of three torpedo-boat destroyers visited Port Arthur and Beaumont. They were enthusiastically welcomed by the people.

The baseball season opened at Beaumont on April 5, and hearty support has been accorded the local team. The early games indicate that the Beaumont team will make things interesting in the race for the championship of the Texas league.

Brockton, Mass.

Brockton's Loyalty Parade was held on the evening of April 5, and was a remarkable demonstration. There were over 10,000 in line; the marchers included various nationalities. The line required over an hour to pass a given point. Many bands played, there was singing, and "the spirit of '76" was strongly in evidence. It is estimated that a crowd of over 40,000 turned out to see Brockton's biggest parade, and there was great applause for the marchers.

Our company had about seventy-five men in line, and eleven gaily decorated automobiles filled with women employees and their friends. We also had half a dozen searchlights scattered throughout the business section, illuminating flags on the tops of the buildings.

After the parade a flag raising was held at Perkins Park, and an address was made by Major T. L. Walsh.

Mr. P. W. Cutler of our sales force and C. S. Allen of the distribution department resigned on April 7 to enter the service of the Buzzard's Bay Electric Company.

Six of our office men have enlisted in the Naval Reserve. One has already been called out, and the others expect to be called upon at any time.

This company secured first prize in a window display contest recently held by the Chamber of Commerce. The window was fitted up as an electric kitchen, and attracted great attention. The prize, a \$150 course in the International Correspondence Course, goes to one of our lighting solicitors, Clark A. Tallman, who originated the idea and dressed the window.

Mr. and Mrs. A. F. Nelson have announced the birth of a son.

El Paso, Tex.

Mr. M. M. Phinney and Mr. L. R. Nash spent a week in El Paso recently.

Mr. and Mrs. H. S. Potter attended the Southwestern Electric & Gas Association Convention, which was held in Dallas during the latter part of April.

Mr. E. J. Davis, assistant superintendent of railways, has been transferred to Beaumont, Tex., as claim agent and purchasing agent of the properties there.

Mr. K. L. Bradford, formerly with the Brockton & Plymouth Railway Company, Plymouth, Mass., has been transferred to the accounting department of this company.

Mr. J. W. Loef, manager's clerk, Mr. L. J. Catheron, chief clerk in the accounting department, Mr. L. E. Delf, lighting superintendent's clerk, and Mr. A. K. MacNaughton, substation operator, have joined the Officers' Reserve Corps and have left El Paso this week for the training camp at Leon Springs, Tex., which opens on May 9.

Fort Worth, Tex.

Mr. H. T. Edgar spent several days during the last of March visiting the Traction Company and friends in Fort Worth.

Mr. M. M. Phinney has made us two short visits recently, one during the last week of March, and again during the week of April 8.

Mr. W. W. Grayson and Mr. Robert Owers, of the auditing department, has been in Fort Worth making the customary audit of the company's books.

Mr. C. B. Roberts, of the power station betterment division, was with us recently for a short stay.

Mr. C. J. Harvin, of the betterment division, has been here calibrating power station and substation instruments.

Mr. G. H. Clifford has been in Chicago attending a meeting of the committee on Transportation-Engineering of the American Electric Railway Association, of which he is chairman.

Galveston, Tex.

Mr. Lorenzo W. Emery, formerly chief clerk of the Paducah Light & Power Company, has assumed similar duties with this company, succeeding Mr. W. L. Drouilhet, who was transferred to the billing department.

On March 9, our assistant treasurer, Mr. F. B. Flahive, left for Fort Madison, Ia., as manager. His successor in Galveston is Mr. W. B. Gibson, formerly chief clerk of the Savannah Electric Company.

Mr. Alba H. Warren, manager, attended the "One-Man Car" conference at Fort Worth, March 26-28.

The day after closing the Fort Worth conference, we received a visit from Messrs. Richardson and Campbell of the Seattle Company, Hardy Croom of the Jacksonville Traction Company, R. M. Harding, Columbus Electric Company, I. M. Stover, Baton Rouge Electric Company, T. J. Hanlon, Jr., Pensacola Electric Company, and several members of the Houston organization.

A hasty tour of Galveston was made in automobiles, followed by a luncheon at Hotel Galvez, the party leaving for Houston in the afternoon via special Interurban car.

Recruiting activities in Galveston are very evident; our company has only lost two or three men up to the present, but several additional members of the organization are likely to join various branches of the service.

Armed guards have been placed along the entire length of the causeway connecting Galveston with the mainland and no trespassers are allowed. Careful restrictions have also been placed on fishing from the various wharves and piers.

Houghton, Mich.

On May 4, Mr. W. L. Weston, formerly manager of the companies at Paducah, Ky., took charge of the Houghton Companies in place of Mr. Otto Snyder, general superintendent, who has been transferred to Glens Falls, N. Y.

On May 7, Mr. H. T. Edgar and Mr. C. W. Kellogg arrived in Houghton and spent several days inspecting the properties. Mr. G. S. Parsloe, from the Boston office, came west with Mr. Edgar, and will remain here as storekeeper for the Electric Light Company.

Mr. W. F. Lusk, of the engineering division, has returned and work on the power station improvements has been resumed.

Mr. Archie Mayotte, chief clerk, leaves May 15 to enter the service of the Consumers Power Company, of Jackson, Mich. His place here will be taken by Mr. R. P. Schumaker, general bookkeeper.

Mr. P. W. Wilder, solicitor at Calumet, has recently successfully passed an examination for entrance into the Officers Reserve Corps training camps, which have been established at various points. In all probability, he will be called to one of these camps within the next few days.

On May 1, navigation was opened through Portage Lake, when the Canadian steamer "Arabia," frozen in at Houghton during the winter, cleared for Port Arthur, Ont. On May 6, steamer "Martin Mullen" arrived from Toledo, Ohio, with 7,500 tons of coal. This is the first lake shipment of any character to arrive in Portage Lake this season.

The Hancock naval reserves, the Calumet engineers, and the Houghton militia have all been ordered from the Copper Country for duty "somewhere in the United States."

The Lighting Company has recently purchased one Smith form-A truck for the Calumet line crew.

The Calumet & Hecla Mining Company is going to consolidate its several coal docks into one big new dock, situated at Lake Linden. The new dock is to cost \$80,000.

Houston, Tex.

The biggest event of the month was the visit paid the Houston ship channel turning basin by the torpedo boat destroyers, "Monaghan," "Reed," "Worden" and "McDonough." These boats came to Houston to stimulate recruiting and traversed the ship channel from Galveston entrance without tug or assistance. The boats spent nearly two weeks in the basin and were visited by approximately 80,000 people. One line of this

company, the Central Park line, alone handled more than 22,000 people in one day. The officers and crews of the boats were the recipients of a number of entertainments tendered by the civic bodies of Houston, and the sailors were feted and fed by the citizens. The boats sailed under sealed orders at the end of the month.

Oil activities have been considerable during the month. So many gushers have been brought in in the Houston fields that they cease to be a novelty. It is a matter of slight interest to hear or read of a 5,000, 8,000 or 10,000 barrel gusher being brought in in the Goose Creek, Humble or other field in the Coast country. Goose Creek is now leading all fields in the Gulf Coast country. The production is running around 30,000 barrels a day. Humble is holding up with 25,000, and Sour Lake is running about 20,000. A very large amount of wildcatting is being done and the prospects are good for the discovery of additional territory.

The Sinclair interests, including H. F. Sinclair of New York, C. A. Braley of Kansas City, and E. R. Kemp of Tulsa, visited Houston with a view of establishing an oil refinery and pipe line terminal in Houston. The Sinclair interests propose to establish a refinery somewhere on the Gulf Coast, which would entail an expenditure of about \$5,000,000 and would care for the products of their holdings in the Oklahoma fields and about 9,000,000 acres of oil lands at Costa Rica.

A branch of the National Safety Council, known as Houston Safety Council No. 30, has been formed with a membership of seventeen. H. W. Withers, adjuster in the claim department of this company, was chosen as the first president, with R. M. Glover of the Southern Pacific as vice-president, R. D. Kennedy of the Texas Employers' Insurance Association as secretary and treasurer. All firms in Houston will be asked to join the association and the Safety First movement will be extended into every field of endeavor in the city. A special effort will be made in the direction of school children.

The American National Red Cross Association is making an energetic campaign for members in Houston. Membership branches have been opened in several parts of the business section and those in charge of the campaign are making an effort to secure 2500 new members in one week.

The weather for the month of March was slightly warmer than the average for the month for the past twenty-six years, and as February and March also were slightly above normal there is an accumulated excess of temperature since January 1 of 292 degrees. The rainfall was far below normal. Only 0.65 inch fell during the month, which is a deficiency as compared with the average of twenty-six years of 2.61 inches. There is an accumulated deficiency of 6.43 inches since January 1. The month was comparatively cloudy. There were seven clear days, nine partly cloudy, fifteen cloudy and six upon which rain fell. Thunder storms occurred on the 7th, 9th and 26th, and a killing frost occurred on the 5th. The prevailing direction of the wind was southeast, with an average hourly velocity of 11.1 miles per hour, and with a maximum velocity of 29 miles from the south on the 31st.

Jacksonville, Fla.

Mr. J. H. Hood, of the construction department of the Boston office, was a recent visitor to this city.

Mr. B. L. Grooms, railway superintendent of the Savannah Electric Company, spent a few days with us recently.

Manager Hardy Croom attended a recent conference of Stone and Webster managers in Dallas, Tex.

Superintendent B. T. Longino enjoyed a two-day fishing trip on the Gulf Coast in March. A big catch of kingfish testified to Mr. Longino's prowess as a wielder of the rod and reel.

The barge "Vale Royal" discharged a cargo of coal at our power station pier during the early part of April.

All of the local troops and naval militia have been called into government service. Several of our trainmen were affected by the call to colors.

The shipbuilding industry in this city is on the boom, as the result of the placing of several large orders with local concerns. It is confidently expected that this industry will furnish employment to 3,000 additional laboring men, skilled and unskilled.

The Merrill-Stevens Shipbuilding Company has been awarded contract to construct four steel steamers of 5,000 tons capacity each. The receipt of this big order will necessitate the expansion of this company's shipyard facilities by a development of its South Jacksonville holdings.

The Hillyer-Sperring-Dunn Company is laying keel for its third schooner. This shipbuilding company announces receipt of contract to build twelve 3,000-ton wooden vessels for the government, delivery to be made nine months hence. This plant is located in South Jacksonville, just south of the Florida East Coast Railway bridge.

The Cummer Lumber Company and the G. S. Baxter Company have received contracts to build 3,000-ton wooden vessels for the government. The former company is located at the terminus of our Phoenix Park car line, while the latter is located at the municipal docks site.

Keokuk, Ia.

Members of Company L of the First Regiment, Iowa National Guard, on duty at the entrance to the Government grounds and works of the Mississippi River Power Company, were recently given special orders to increase their vigilance. The ordinary public visitor is now denied access to the Keokuk Power Station, admission being granted only to those having business to transact or to such technical visitors as may be properly vouched for. During the night hours, guards are instructed to fire on all trespassers who fail to halt after three warnings have been given.

On the evening of April 9, Keokuk citizens united in an enthusiastic public demonstration of loyalty and national patriotism. A special feature of the occasion was a parade through the business section of the city, which was followed by addresses delivered from the veranda of the Elks Club. Appropriate music characterized the program. The High Tension Club took an active part in the demonstration. Nearly 150 members of the organization marched in the parade in a unit made up as follows:

First a twelve-piece drum corps, next two standard bearers with the Stars and Stripes, and just behind them a large Triskelion flag made up especially for the occasion. Then followed the membership of the club, headed by President Venning, each man carrying a flag. The occasion was throughout a great success; it showed that Keokuk and vicinity are not lacking in patriotism.

The steamer "Keokuk," of the Blair Line, made its first trip for the season through the government lock on Saturday, March 31. Through packet service between St. Louis and St. Paul is scheduled to begin in May. Navigation was officially declared open on April 1, the local government fleet having been active for some time previous to this date.

Mississippi River Power Company

Construction work on the new plant to be built by the Electric Smelting & Reduction Company at Hamilton, near the east end of the dam, was begun on the afternoon of April 5. A group of seventy-five citizens of Hamilton, with friends from Keokuk, were present when the ceremony of breaking ground took place. Mr. J. A. Gordon of Hamilton removed the first spadeful of earth, using the same shovel with which he turned sod at the beginning of construction of the dam. Work is now in progress of placing foundations for the first building, the steel work for this structure being expected to arrive by May 1.

The Electric Smelting and Reduction Company is capitalized at \$300,000 and will operate electric furnaces with a product of ferro-manganese. Plant growth will be by units, the first installation amounting to 3,000 kilowatts in capacity. Electric power will be taken at 11,000 volts, being supplied by cables laid across the dam. It is expected that the first furnace will be in operation on or about July 1.

Improvement in the construction of the Meppen-Alton transmission line, over which energy is supplied to the East St. Louis Light and Power Company, is being made by the installation of steel towers at a number of points, replacing wooden poles previously in service. Last year 118 towers were placed and this spring 171 additional steel structures will go into service. In 1918 the remainder of the wooden poles will be replaced. The Meppen substation switch rack structure, supporting two 110,000 volt air break switches, which was originally constructed of wood, is to be replaced by steel and material is now on the ground to make this change. These improvements will materially contribute to the insurance of continuous service to the East St. Louis Light and Power Company.

The Keokuk Electro-Metals Company are making substantial progress in the extension of their present ferro-silicon furnace plant. A second 11,000 volt transmission line is being built to supply additional electric power, the poles for this circuit being now set with crossarms and insulators in place. Wire has just been received and will be strung in the near future. Delivery of additional energy will be made as soon as the Electro-Metals extension is completed, the present expectation being that this equipment will be ready within a few months.

On March 26 fifty-two students from the University of Nebraska were shown over the Keokuk development. On the 28th a group of engineering students from the University of Pennsylvania, in charge of Professor R. H. Fernald, visited the Keokuk Power Station.

The South Quincy pumping station of the Marion County Drainage District has been practically completed by the Perkins Engineering Company and will go into operation within the next few weeks. This plant, located near the west bank of the Mississippi River south of Quincy, Ill., will be supplied with power from the 11,000 volt transmission circuit,

which is connected to the Hulls-Quincy line through step-down transformers at the Perkins substation.

Mr. Otto Snyder, general superintendent of the Houghton Companies, visited the district manager's office at Keokuk on April 12.

Mr. B. H. Menke, superintendent of substations, was transferred on April 1 to the Connecticut Power Company, to the position of superintendent of transmission lines and substations. Mr. W. E. Corr, system operator, was made superintendent of substations and Mr. A. J. Sears promoted to system operator.

Keokuk Electric Company

The Car-men's Club held its regular monthly meeting in the car barn Saturday night, April 7, 1917.

Work is well under way for supplying the town of Montrose with electric current. It is expected that the current in this town will be turned on July 1.

Manager J. P. Ingle recently returned from a business trip to Des Moines, Kansas City, St. Louis, Dallas and Fort Worth. While at Fort Worth he attended the conference of Stone & Webster railway men.

J. H. Vandever of Tampa, Fla., visited our company during the past month.

W. H. Edwards of the engineering division of Dallas, Tex., is in Keokuk to relay track on Main street.

Mr. Earl E. Frank of the accounting department has announced the birth of a son on March 28.

During the month there have been several changes in our accounting department. E. M. Miller, collector, left the employ of the company, and Otto Hill, floor salesman, took his place. Leon Halbeck, order clerk, was transferred to the commercial department, and Dewey Ewing employed as order clerk. M. H. Montague, expense clerk, left the company, and Ralph Bear, cashier, took his place. E. Doyle, bill clerk, was made cashier, and Edward Schmidt was employed as bill clerk.

Hubert Hume, an employee of our gas department, has announced the birth of a daughter on March 19.

Key West, Fla.

Among the visitors in our Island City during March was Mr. J. H. Hood of the Engineering Division of Stone & Webster. Mr. Hood, accompanied by Mr. R. G. Carroll, manager, spent several days in Havana, Cuba.

Mr. L. P. Christenson, secretary of Key West Investment Company, was in the city looking over the property of the Investment Company. Mr. E. V. Toomer, a real estate dealer of Jacksonville, and Mr. E. W. Lane, president of the Florida National Bank of Jacksonville, accompanied Mr. Christenson on his trip of inspection, with the intention of interesting capitalists who will put some money and improvements in property here.

A squad of the Miami militia, Company M, of the Florida National Guard, are guarding the costly concrete causeway south of Marathon, and a squad of the Georgia National Guard of Savannah, Ga., have gone into camp at Marathon for the purpose of guarding the Florida East Coast Railway from Long Key to Pigeon Camp. All aliens are barred from Key West.

The sale of revenue stamps for the month of March is very encouraging, compared with the same period of previous years. The sale of March, 1917, stamps was very nearly as large as that in 1915 and 1916 together. Comparative figures for the month of March of the last five years are as follows:

1913	\$14,976.70
1914	14,185.06
1915	8,864.43
1916	11,221.14
1917	19,230.42

Our main source of income is the cigar industry.

Rear-Admiral John R. Edwards of the United States Navy, in a report made to the Commission of Navy-yards and Naval Stations, recommends enormous improvements for Key West.

The Bell Telephone Company has taken over the Automatic Telephone Company.

All places of business close at noon on Wednesdays in order to give everybody a chance to enjoy a half holiday during the summer months.

Key West is listed among the ports designated as defensive sea area; ships may enter only between sunrise and sunset, and only after receiving permission during these hours.

Lowell, Mass.

Mr. Harvey Perreault joined the sales force of the company during the month as commercial messenger.

Mr. Clayton R. Kimball, for the past seven years salesman in our commercial department, leaves the company April 28 to go into business for himself.

Mr. Harry Decelle, billing clerk in our accounting department, was called out with Company C, Sixth Regiment, during the month. While at the armory, Mr. Decelle occupied the position of chief clerk.

Misses Annette Girard and Evelyn Lee joined the clerical force of our accounting department during the month.

Mr. Whittaker and Mr. Livingston of the auditing department are now making a regular audit of the company's books.

Paducah, Ky.

Mr. A. S. Nichols, formerly manager at Fort Madison, Ia., is now in this city and will shortly become manager of the Paducah Companies. Mr. W. L. Weston will leave in a few days for Houghton, Mich., to become manager of the Stone & Webster companies in the copper country.

Mr. T. P. Adams, of the Engineering Division, recently arrived in this city for the purpose of taking charge of the work of double tracking Broadway from Eleventh to Seventeenth street in preparation for the pavement on this street. Approximately fifty men have been at work since his arrival and considerable progress has already been made. It is expected the job will be completed in less than three months.

Pensacola, Fla.

Mr. R. S. Fuller, of the statistics department, has been transferred to Pensacola as student in the railway department.

Manager T. J. Hanlon, Jr., has returned from Fort Worth, Tex., where he attended the convention of operating managers.

The Company Bowling League, composed of teams from the office, lighting department, transportation department and shop, closed in March with the shop team winner; they played off a tie with the lighting department team for first place. Much interest was displayed in the games and it is expected that the league will be organized again next year.

With the new appropriations available, the Aeronautic Station is calling for bids on a large amount of construction work for furthering aeronautical activities at the Station. It is not known just what is the nature of all construction jobs, but it is stated that a large number of laborers and skilled mechanics will be needed when it is all under way. Motor generator sets are being installed in the power plant, to use current from our company.

On April 10, the Gulf, Florida and Alabama Railroad was reorganized, with new officers. J. B. Smith succeeds G. A. Berry as general manager, being in charge of operations at Pensacola. It is thought that the reorganization will put new life into the road and that new equipment will be purchased immediately. The new \$150,000 coal dock, which has remained idle for about a year, will soon be put in operation.

Savannah, Ga.

Mr. H. C. Foss, manager, and Mr. T. N. Hartin, master mechanic, attended the meeting of Stone & Webster officials, recently held in Fort Worth. Mr. Foss spent a day in Paducah on his way back to Savannah.

Mr. J. E. Jordan, superintendent of the meter department, is on his vacation in South Carolina.

Mr. A. B. Fink has been transferred from the meter department to the engineering department.

Barbee's Pavilion at Isle of Hope was formally opened for the 1917 season on April 6. Improvements have been made and several new animals have been added to the zoo, and Mr. Barbee looks for a record season.

All the Savannah troops which have been doing duty on the Mexican border have returned home. Various out-of-town companies as well as the local companies, comprising the First Regiment of infantry, were ordered to Savannah to be mustered out, so that the city has had a very martial appearance. Instead of being mustered out, however, these troops, together with all the other returned organizations, were retained in the Federal service and have been assigned to guard duty at various points in the state. Battery "A" of the Chatham Artillery, which was the first organization to return from the border and which was mustered out immediately, has been ordered back into the federal service and is now at Brunswick.

Seattle, Wash.

Experiments in the use of powdered coal for fuel now being conducted at the Western avenue steam plant of the Puget Sound Traction, Light & Power Company, in which the Pacific Coast Coal Company is also taking an interest, are attracting attention from many concerns in the West,

which have been considering the matter of a conservation of fuel by a use of the finer screenings now thrown on the dumps. The Puget Sound Traction, Light & Power Company has installed a temporary plant for use during the period of experimentation, and the results thus far obtained appear to justify the claims made during the past decade that the dumps and even the sludge ponds can be made productive. The co-operation between this company and the Pacific Coast Coal Company commences at the briquetting plant of the latter concern, where the coal, previously sent to the dumps, has been pulverized so that 85 per cent of it will pass through a 200-mesh screen and 95 per cent through a 100-mesh screen. It is brought to the Western avenue substation in a box car with a specially designed metal lined hopper. The coal is taken from the car to a conveyor and then to a bunker, from which it is fed to the furnaces through a 30-foot pipe by air pressure.

Mr. Henry Hull, superintendent of steam heat for this company, has written a technical description of the burning of pulverized coal, which appears in the April issue of the *Puget Sound Electric Journal*.

Mr. G. A. Richardson, general superintendent of the railway department, and Mr. A. D. Campbell, superintendent of rolling stock and shops, of this company, returned to Seattle April 6 from a meeting of representatives of Stone & Webster companies at Fort Worth, Tex., called to discuss standardization of equipment. Messrs. Richardson and Campbell were away about three weeks, returning to Seattle by way of El Paso and Los Angeles.

The Stone & Webster Club of Washington will hold its annual meeting and election of officers, in Seattle, May 16.

James E. Allison, for many years the employment agent of this company and later superintendent of inspection, died at his home in Seattle, March 30, and was buried at Tenino, Wash., April 1, under the auspices of the Masonic fraternity. Mr. Allison was a street railway man at the time of the consolidation of the various lines of Seattle under the incorporated title of The Seattle Electric Company.

George Dunnington, until recently chief clerk of the department of credits and collections, died suddenly April 7 and was buried from the Masonic Hall, Fremont, April 11.

Tacoma, Wash.

Mr. and Mrs. Louis Bean have recently returned from a trip to Boston and New York.

Mr. B. E. VanVliet, traveling auditor, is again located on the Pacific Coast and has been making an audit of the Tacoma companies' books.

Mr. Joseph Bowes, Jr., who was transferred from the position with these companies of superintendent of distribution in the power department to the position at Port Arthur, Tex., of general superintendent of light and power, writes that he is now nicely located and likes his new work exceedingly.

Mr. W. L. Robbins, who has recently been with the Seattle company assisting in appraisal work, is again in Tacoma and is at present getting out statistical data for the light and power department. Mr. and Mrs. Robbins are receiving congratulations on the birth of a daughter February 9.

Much interest is of course being taken in the Red Cross Society and

the National League for Women's Service and registrations have been much greater than expected. The Tacoma Chapter of the Red Cross Society, with its thirteen auxiliaries, now has a membership of nine hundred, and the National League for Women's Service to date has had seven hundred and fifty registrations. The Red Cross Ball on April 7, which was in the nature of an advertising carnival, was a decided success, all Tacoma firms and organizations assisting in every way possible. In the Patriotic Parade on the downtown streets April 16, fully 15,000 people marched. These companies were represented by two hundred officials and employees.

COUPONS AND DIVIDENDS DUE

	Per Cent.
May 1, Cape Breton Electric Company, Limited, Preferred stock, 6 per cent.	3
May 1, Cape Breton Electric Company, Limited, Common Stock.	1½
May 1, Eastern Texas Electric Company 5s, 1942.	2½
May 1, *Edison Electric Illuminating Company of Brockton, Capital Stock.	2
May 1, *Fall River Gas Works Company, Capital Stock.	3
May 1, Galveston Electric Company 5s, 1940.	2½
May 1, Houghton County Electric Light Company, Preferred Stock, 6 per cent.	3
May 1, Houghton County Electric Light Company, Common Stock.	2½
May 1, Jacksonville Electric Company 5s, 1927.	2½
May 1, *Lowell Electric Light Corporation, The, Capital Stock.	2½
May 1, Mississippi River Power Company (Debentures) 6s, 1919.	3
May 1, Paducah Traction and Light Company 5s, 1935	2½
May 1, Pawtucket Gas Company of New Jersey, The, 4s, 1932.	2
May 1, Ponce Electric Company 6s, 1927.	3
May 1, *Public Service Investment Company, Preferred Stock, 6 per cent.	1½
May 1, Railway & Light Securities Company 5s, First Series, 1935; Second and Third series, 1939; Fourth series, 1942; Fifth series, 1944; Sixth series, 1946.	2½
May 1, Seattle Railway Company, The, 5s, 1921.	2½
May 1, *Sierra Pacific Electric Company, Preferred Stock, 6 per cent.	1½
May 1, Whatcom County Railway & Light Company 5s, 1935.	2½
May 15, *Keokuk Electric Company, Preferred Stock, 6 per cent.	1½

Payable quarterly.

	Per Cent.
May 15, *Tampa Electric Company, Capital Stock.....	2½
June 1, Baton Rouge Electric Company, Preferred Stock, 6 per cent.....	3
June 1, Berkshire Power Company, The, 5s, 1934.....	2½
June 1, Blackstone Valley Gas and Electric Company, Preferred Stock, 6 per cent.....	3
June 1, *Blackstone Valley Gas and Electric Company, Common Stock.....	2
June 1, Bridgewater Electric Company, The, 5s, 1920..	2½
June 1, Brockton and Plymouth Street Railway Com- pany 4½s, 1920.....	2¼
June 1, *Central Mississippi Valley Electric Properties, Preferred shares, 6 per cent.....	1½
June 1, *Connecticut Power Company, The, Preferred Stock, 6 per cent.....	1½
June 1, Dallas Electric Company 5s, 1917.....	2½
June 1, Eastern Texas Electric Company 6s (Coupon Notes) 1918.....	3
June 1, Edison Electric Illuminating Company of Brockton 5s, 1930.....	2½
June 1, *Northern Texas Electric Company, Common Stock.....	1
June 1, Pawtucket Electric Company 5s, 1916.....	2½
June 1, Pawtucket Gas Company of New Jersey, The, Preferred Stock, 5 per cent.....	2½
June 1, Pensacola Electric Company, Preferred Stock, 6 per cent.....	1½
June 1, Puget Sound Power Company 5s, 1933.....	2½
June 1, Tampa Electric Company 5s, 1933.....	2½
June 15, *El Paso Electric Company, Common Stock...	2½

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

APRIL 30, 1917

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	100	No	Pref	8%	168
Baton Rouge Elec. Co. { Bond, 1939 Notes, April, 1918	5%	92	6%	91		.....
	6%	100				
Blackstone Valley Gas & Elec. Co.	5%	102½	*6%	107	8%	160
Blue Hill St. Ry. Co., The	5%	91	No	Pref		.....
Brockton & Plymouth St. Ry. Co.	4½%	91	*6%	75		15
Cape Breton Elec. Co., Ltd.	5%	93	6%	85†	3%	51†
Central Mississippi Valley Electric Properties	No	Bonds	*6%	75		12 N
Columbus Elec. Co. { Bonds, 1933 Notes, July, 1917	5%	90	6%	85		35
	6%	100½				
Columbus Power Co., The	5%	94		.....		.....
Connecticut Power Co., The	5%	98	*6%	96		100
Dallas Elec. Co. { Notes, Jan., 1921 Notes, June, 1917	6%	101	*6%			
	5%	100				
Dallas Electric Corp. Bonds, 1922	5%	100		.....		.....
Eastern Texas Elec. Co. { Bonds, 1942 Notes, Dec., 1918	5%	92½	*6%	90	5%	62½
	6%	100½				
Edison Elec. Illg. Co. of Brockton { Bonds, 1930 Notes, March, 1921	5%	100	No	Pref	8%	165†
	5%	100				
El Paso Elec. Co.	5%	99	6%	100	10%	110
Fall River Gas Works Co.	No	Bonds	No	Pref	12%	240†
Galveston Elec. Co.	5%	95		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	80 ^B / _L		35 ^B / _L
Galveston-Houston Elec. Ry. Co.	5%	93	No	Pref		.....
Haverhill Gas Light Co. (Stock par value \$50)	No	Bonds	No	Pref	9%	97
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	96	6%	23†	5%	17†
Houghton County Traction Co.	5%	93	*6%	85		50
Houghton County St. Ry. Co., The	5%	100	No	Pref	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	99 ^B / _L		.....		.....
Jacksonville Elec. Co.	5%	96	No	Pref	No	Com
Jacksonville Traction Co.	{ Bonds, 1931 Notes, March, 1917	5% 88 6% 98	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	95		.....
Key West Elec. Co., The	5%	72½		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	222½
Mississippi River Power Co.	5%	75 ^A / _B		35 ^A / _B		10 ^A / _B
Northern Texas Elec. Co.	5%	94	6%	85 ^B / _L	4%	55 ^B / _L
Northern Texas Traction Co.	5%	101	No	Pref		.....
Pacific Coast Power Co.	5%	97	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	75 L		15 L		5 L
Pensacola Elec. Co.	{ Bonds, 1931 Notes, Jan., 1919	5% 90 6% 99		78		11
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	85½		40
Puget Sound Elec. Ry.	5%	85 B		.....		.....
Puget Sound Power Co.	5%	96	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	{ Bonds, 1919	6% 99	*6%	70		28
Railway & Light Sec. Co.	{ First Series, 1935	5% 99	*6%	98	6%	95
	{ Second Series, 1939	5% 99				
	{ Third Series, 1939	5% 99				
	{ Fourth Series, 1942	5% 99				
	{ Fifth Series, 1944	5% 99				
	{ Sixth Series, 1946	5% 99				
Savannah Elec. Co.	5%	70 ^B / _L		20		5
Seattle Elec. Co., The	{ 1st Mortgage, 1930 Cons. & Ref., 1929 Seattle-Everett, 1939 The Seattle Ry., 1921	5% 100½ ^B 5% 95 L 5% 90½ 5% 100	No	Pref	No	Com
Sierra Pacific Elec. Co.	{ Notes, April, 1919	5% 99½	*6%	75½		6
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	100	No	Pref	10%	129
Whatcom County Ry. & Lt. Co.	5%	93	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified.

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange. L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights.

LIBRARY NOTES

We have recently received the loose leaves for March of *Nelson's Encyclopedia*, which came just too early to include Wilson's War Message, but which contain the following which are of timely interest: "President Wilson's Peace Message to the Nations at War; Germany's Peace Proposals; Reply to the Allies; Mobilization of the U. S. Militia in 1916; New Military Training Law of New York State; New Army and Navy Acts of 1916; Income Tax Law of 1916; Tariff Changes of 1916; Illiteracy Test Law of 1917; Rural Credits Act of 1916; U. S. Census of Manufactures of 1915; Statistics of Agriculture for 1916; Revolution in Russia of March, 1917."

The Library Journal for April, 1917, is entitled "*Business Number*." Some of the important articles are as follows: The Library and the Business Man, by Arthur E. Bostwick; New-ark's Business Branch, by John Cotton Dana; Business in Print, by Richard H. Waldo; Making a Market in Libraries, by Adelaide R. Hasse; Making the Library More Useful to Business Men, by F. M. Feiker; Library Service to the Business Man, by W. Dawson Johnston; Getting Business Books Used, by Frank R. Stockdale. In addition to these there is a symposium by various librarians, general and special, and, on the whole, this issue of the Journal makes a good text book for those who wish to understand business library problems and possibilities.

The Public Affairs Information Service is our latest index, and one of the most useful we have subscribed for. Look it over and see how it hits your particular interests. A good sample of its entries may be found under the title "Thrift," where there are a dozen references, three of which are considerably expanded, so as to afford more information than the bare index usually gives.

"*The Teaching of Thrift*," prepared by H. B. Bonner, issued in Charleston, W. Va., has suggestions for teaching in public schools. It ends with three songs, of which both the words and music are given.

"*Standardizing the American Flag*" is a clipping from the *Boston Transcript* of April 12, which is likely to be in demand, as many questions come up as to size, stripes, etc., etc.

"*List of House Organs Published in the United States and*

Canada," is a clipping from "Postage," March, 1917. This answers many vexed questions, and should be appreciated. It gathers in a few pages information that covers many obscure publications. The science of house organs is something that needs to be developed.

The Final Report on the *Price of Gasoline in 1915*, dated April 11, 1917, by the Federal Trade Commission, has the following in the letter of transmittal: "This report is one of several already submitted or in process of preparation in the course of this commission's general investigation of the petroleum industry, pursuant to Senate Resolution 109, Sixty-third Congress, first session, and Senate Resolution 457, Sixty-third Congress, second session." It is a 224-page document, with classified table of contents, but no index.

"The Present Status of the State-wide *Initiative and Referendum Statutes*, What They Are, Where They Are in Use, and How They Work," is the title of Senate Document 736, of the Sixty-fourth Congress, second session, presented by Mr. Owen, March 1, 1917, and written by Judson King, Executive Secretary, The National Popular Government League.

"The Commercial Status of the Modern *Petrograd*," by a Foreign Representative of the National City Bank of New York, is contained in pages 26-31 of "The Americas," the regular publication of the National City Bank, in the issue of February, 1917.

"*Community Action Through Surveys*," by Shelby M. Harrison, Director of the Department of Surveys and Exhibits, Russell Sage Foundation, is the title of a paper presented in part at the Indianapolis meeting of the National Conference of Charities and Correction, May, 1916, largely to consider typical illustrative surveys, as in the case of Springfield, Ill.

"Partial List of Employers Who Are Reported To Have Established Some Form of *Welfare Work*" is contained in pages 315-334 of the Monthly Review of the U. S. Bureau of Labor Statistics for February, 1917, and should prove of use in answering questions regarding betterment in the management of concerns which come to the Library from time to time from members of the organization and persons outside.

Disposal of books, pamphlets, periodicals, etc., by informal auction or gift, Friday, June 1, 4:30 P. M.: Transactions of engineering societies, trade journals, various monographs, etc., will be included.

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil Engineering

- 258 Wharves and piers: their design, construction and equipment. First edition. Carleton Greene. New York, 1917. 248p, 6x9, illus, diags. *0732.G83
- 259 Elements of hydraulics. Second edition, revised and enlarged. S. E. Slocum. New York, 1917. 329p, 6x9, illus. *0725.Sloc53
- 260 Profile surveys of rivers in Wisconsin. U. S. Geological Survey. Water Supply Paper 417. Wash., 1917. 16p, 6x9, maps. W S I 417
- 261 Surface water supply of the United States, 1914. Part XII. North Pacific Drainage Basins. A. Pacific drainage basins in Washington and upper Columbia River Basin. U. S. Geological Survey. W S I 362
- 262 Surface water supply of the United States, 1914. Part XI. Pacific slope basins in California. W S I 391

(23) Chemistry, (26) Lighting

- 263 The fixation of nitrogen. [Reprinted from the Journal of Industrial and Engineering Chemistry, Vol. 9, No. 3, p. 233. March, 1917.] John E. Bucher. 53p, 6x9, diags. *074.B852
- 264 Report of the chemist. [From annual reports of the Department of Agriculture.] 1915. Bureau of United States Chemistry. *6883.1915
- 265 N. E. L. A. Rate Book and supplements. 1917. Committee on Rate Research. National Electric Light Association. *6921.025.1917

(40) Gas

- 266 Artificial gas and by-products in 1915. U. S. Geological Survey. *6874.075ag.1915
- 267 Monthly bulletin of the National Commercial Gas Association. National Commercial Gas Association. N C G A

(73) Sociology and Industrial Management

- 268 Massachusetts report of the special commission on social insurance. House No. 1850. Feb., 1917. *1400.In7s
- 269 Suggestions for the teaching of thrift in the public schools. West Virginia State Superintendent. Charleston, 1917. 54p, 6x9, illus. *2409.029
- 270 Essays in the earlier history of American corporations. Harvard Economic Studies. Books one and two. Joseph Stancliffe Davis. Cambridge, 1917. 547p, 6x9. *029.D294.Vols. 1&2

(74) Financial

- 271 Bulletin. Feb., 1917. American International Corporation. New York, 1917. 71p, 6½x9½. *054.Am3527b
- 272 The Bankers Encyclopaedia "Purple Book." March, 1917. Bankers Encyclopaedia Publishing Co.
- 273 Report. Senate No. 344. Feb., 1917. Special Commission Appointed to consider the Financial Condition of the Boston Elevated Railway Company. Boston, 1917. 70p, 6x9. *1461.El2.025ac

(75) Annual Reports

- 274 Twenty-first annual report. 1916. Detroit Public Lighting Commission. *2972.L62.1916
- 275 Annual report. 1916. Federal Reserve Board. *6800.F317.1916

- 276 Fourth annual report of the public service commission. Jan., 1917. Vol. I. Reports and orders. Massachusetts Public Service Commission. *1404.1916. Vol. I
- 277 The year book with proceedings of the . . . annual convention held in . . . 1916. United States Brewers' Association. *6999. Un3.02.1916
- 278 Thirty-seventh annual report of the Director of the United States Geological Survey. 1916. U. S. Geological Survey. *6874.1916

(76) Legal

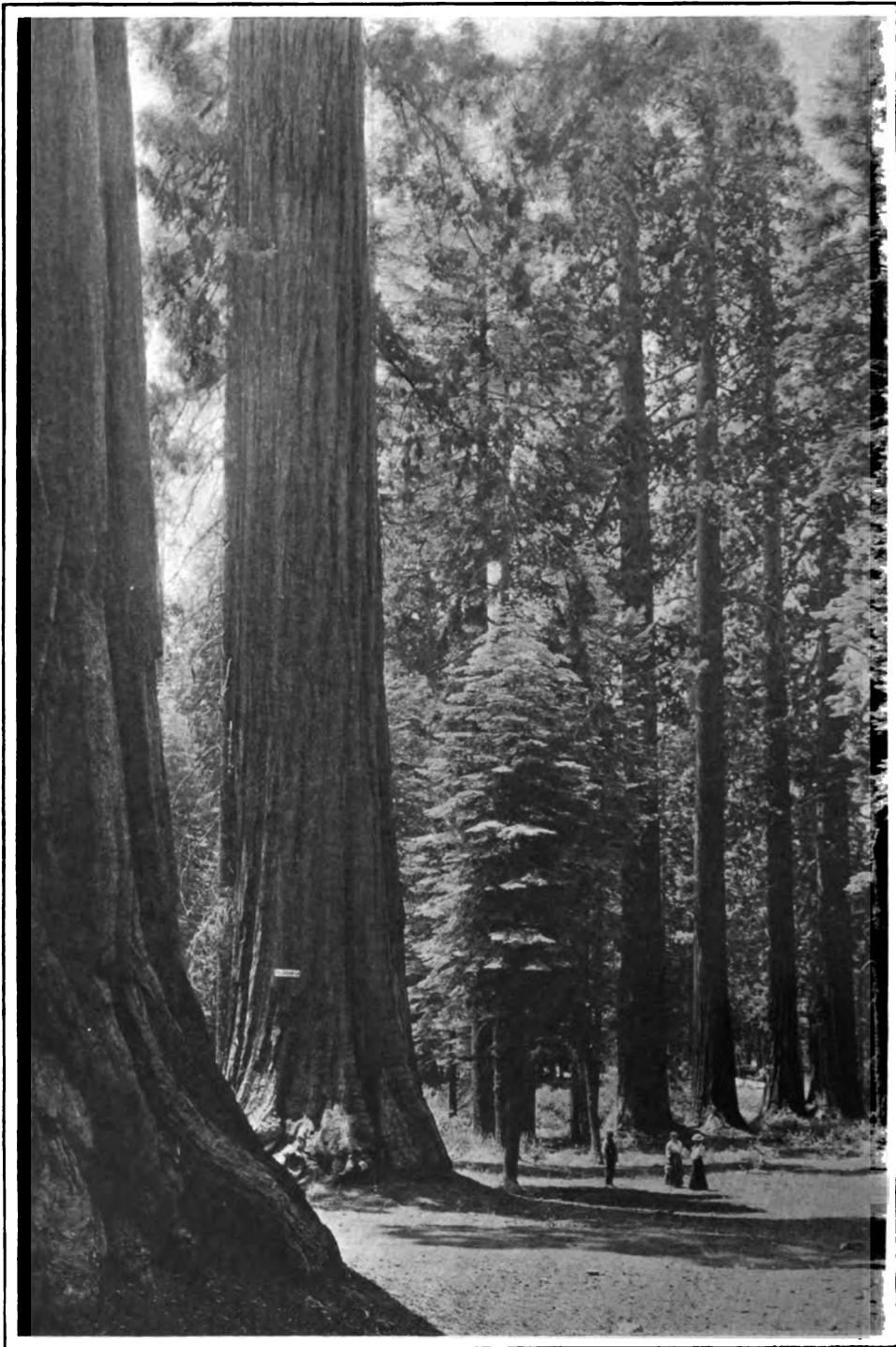
- 279 Federal Trade Commission Service: general orders, rulings and regulations of the Federal Trade Commission in connection with the Federal Anti-Trust Laws. The Corporation Trust Company. Jersey City (1917). vp, 7x10. *6892.C817
- 280 Income tax service: in four parts. 1916. The Corporation Trust Company. *0318.C817in.1916
- 281 Digest and index of opinions of counsel: informal rulings of the Federal Reserve Board and matter relating thereto. [From the Federal Reserve Bulletin, 1915-16.] Federal Reserve Board. Wash., 1917. 63p, 6x9. *6800.F317.096
- 282 Report of the joint special committee on building legislation relative to uniform building legislation. Feb., 1917. Massachusetts Legislature. Boston, 1917. 209p, 6x9. *1400.B868
- 283 The Federal Reserve Act, the National Bank Act and all other Federal laws relating to banking, with complete indexes and references. New York National City Bank. New York, nd. 203p, 6x9. *0315.N213
- 284 Workmen's compensation laws of the United States and foreign countries. Jan., 1917. Bureau of United States Labor Statistics. Wash., 1917. 961p, 6x9, map. *6899.B203
- 285 Reasonableness and legal right of the "minimum charge" in Public Utility services. Samuel S. Wyer. Columbus, 7/1/16. 82p, 6x9½. *036.W97
- 286 Federal Income Tax Law: as amended Sept. 8, 1916. Being Title I of the Act of Congress of Sept. 8, 1916, entitled "An Act to increase the revenue and for other purposes." The Corporation Trust Company. 28p, 5½x9. *0318.C817l
- 287 Brief for respondent: city of Columbus, et al., vs. Southern Bell Telephone and Telegraph Co. Railroad Commission of Georgia. 80p, 8x10½. *3504.035ab

(90) Sources of Information

- 288 Information annual: a continuous cyclopedia and digest of current events. 1916. R. R. Bowker Co. *09.B679.1916
- 289 Public Utilities Reports annotated: containing decisions of the Public Service Commissions and of State and Federal Courts. 1917 A Lawyers Co-operative Publishing Co. *035.L449.1917 A
- 290 McGraw Electrical Trade Directory: Railway Edition. A classified directory of American manufacturers of machinery, equipment, supplies and tools entering into the construction of operation of electric railways . . . McGraw Publishing Co., Inc. *093.M178. 2/17
- 291 List of house organs published in the United States and Canada. March, 1917. Postage Publishing Association, Inc. Haverhill, nd. (7p), 9x12. *096.P846
- 292 Manual for the use of the General Court . . . 1917. Massachusetts Legislature. *1400.02g.1917
- 293 Bulletin of the Public Affairs Information Service: a co-operative clearing house of public affairs information. 1916. The H. W. Wilson Co. *096.L96pa.1916

Miscellaneous

- 294 Standardizing the American flag. April 12, 1917. Boston Transcript. *017.T685
- 295 The college of business administration: Day division. Catalogue and announcement. 1917-18. Boston University. *1461.Un3b.1917
- 296 By-laws, officers and list of members. Boston Engineers Club. *1461.En3.093.4/2/17
- 297 Graduate school of business administration of Harvard University. Topics to be considered in various courses: arranged by weeks. Harvard University. *1445.H26gt.3/17
- 298 Our advertising: Part I. Real work the opportunity. Part II. Intensive cultivation the use. Part III. Direct returns the test. Part IV. Good will the guarantee. Stone & Webster Engineering Corporation. vp, 8½x10½. *610.W89.Pts. 1-4
- 299 Anthrax as an occupational disease. Jan., 1917. Bureau of United States Labor Statistics. Wash., 1917. 155p, 6x9, illus. *6899.B205
- 300 The war manual of the World's Work. March, 1917. Doubleday, Page & Co. New York, 1917. (113p), 6½x9½, illus. *017.D743
- 301 National forest areas. June 30, 1916. Wash., 1916. 7p, 8x10, map. *6882.N21a
- 302 The lumber industry. R. S. Kellogg. New York, 1914 [c1913]. 104p. 6x9. *0774.K28
- 303 Commerce reports. Industrial development of Siberia. April 18, 1917. Bureau of Foreign and Domestic Commerce. *6890.C73.027. Siberia



**BIG TREES — GENERAL GRANT, GENERAL SHERMAN AND FOUR GUARDS, MARIPOSA GROVE,
MARIPOSA COUNTY, CAL.**

STONE & WEBSTER JOURNAL

JUNE, 1917

EDITORIAL COMMENT

The Journal of the American Medical Association has compiled some figures showing how greatly Fourth of July casualties have diminished in the fourteen years 1903-1916 inclusive. All accidents not directly due to the discharge or handling of fireworks or other means of noise production and display have been omitted. In 1903, the casualties were 4,449. In 1908, they were 5,623. Since the latter period, there has been a pretty steady decline, the total in 1916 being only 850. The 1903 figures show 466 dead and 3,983 injured. The 1908 figures show 163 dead and 5,460 injured, while those for 1916 show 30 dead and 820 injured. It is certainly an impressive fact that in the fourteen years under survey there have been 44,801 Fourth of July casualties, or more than many a great battlefield could show. Some years ago the public awoke to the appalling character of the situation and went determinedly to work to put a stop to the destruction. If the results shown above have been possible in connection with Fourth of July accidents, equally striking results should be accomplished in connection with the Safety First movement instituted in the recent past. The disasters on railroads and street railways and in manufacturing plants are as needless and as avoidable as those occurring on or around Fourth of July. Some time ago the transportation companies and the manufacturing establishments took the matter of bettering the situation conscientiously in hand. If the public itself would be equally solicitous there would be an important and gratifying improvement.

* * *

A Boston paper recently contained an open letter from a well known Boston business man to the governor of Massa-

chusetts. In it were these words: "President Brush of the Boston Elevated and President Sullivan of the Bay State Street Railway publicly testified that a six-cent fare is absolutely necessary to meet advances in labor, coal, rails, and other supplies. If their testimony is not correct, they should be 'ridden out of town on a rail' for attempting to obtain money under false pretences. If their testimony is correct, it is your duty, as a defender of the Commonwealth, to make insurance of adequate transportation for the future by the only possible method—compensation to the capital that furnishes the transportation." And this also: "Nine-tenths of the people of the state want fair play for both capital and labor. The six-cent fare issue should be met squarely, and either granted or refused; and the reason for the decision made public." And this: "The six-cent fare proposition is a simple one. The request is either fair or unfair."

British and American Methods of Meeting Rising Railroad Costs of Operation

The vice-president of the Boston & Albany railroad has issued a circular letter to the employees for the purpose of enabling them to realize the importance of economy in every possible direction in the care and use of materials and supplies. He has not included fuel in his statement, but says that the excess cost for this item for the current year will be not less than one and one-half million dollars more than the year previous. Rails and ties have advanced proportionately. Prices are still advancing and on account of the war it is difficult to purchase many items, such as duck, black and galvanized sheets, sheet tin, wire, etc., at any price. An itemized statement is appended to this letter showing the increase in cost over normal of 93 materials.

We suspect that the figures will excite surprise in the minds even of many who may have thought they were familiar with the situation. Certainly, most persons will be astonished to learn that of the 93 items here tabulated 22 show an advance of 200 per cent or more. Boiler lagging, for example, has increased 400 per cent. High speed tool steel shows the same advance. Brass, copper, and steel tubing has gone up 300 per cent, as has also bar, sheet and spring brass. There has been an advance of 300 per cent in bar and sheet copper, as well as in

boiler flues and brass castings. Common bar iron is 225 per cent higher, and so are antimony and babbitt metal. Car and engine axles are up 275 per cent. Car forgings, malleable castings, all kinds of rivets, and other commodities have been enhanced 200 per cent. Thirty-nine articles show advances ranging between 100 and 200 per cent, such, for example, as pig and sheet lead, nuts, wire nails, cast iron pipe, galvanized pipe, lead pipe, screws, spikes, car and engine springs, metal tie plates, locomotive tires, valves, cotton and wool waste. In fact, only five of the 93 articles listed have advanced less than 50 per cent.

Bearing in mind that this list does not include such things as rails, ties and fuel, and bearing in mind also the heavy increase in labor costs to which the railroads have been subjected, it is obvious that the roads will find themselves in an embarrassing situation if they are not allowed to advance their rates. Contrast our treatment of the railroads with that of Great Britain. The conditions confronting the British roads were in many respects similar to those in this country. To be sure, the British government took over the railroads at the beginning of the war, a course which it will not be necessary for us to pursue. It left the operating of them, however, in the hands of a committee of railway officials, which proceeded to handle the situation in accordance with business conditions and the exigencies of the war. The railroads of this country have placed themselves at the disposal of the government and are prepared to conduct their affairs with as much regard for the war exigencies as that manifested by the British roads.

The actual operating situation is much the same in the two countries. Consequently, we may learn a great deal from the experience of Great Britain in the last three years. Increasing labor costs have perplexed the British railroads quite as much as the American. In the months preceding the war they were threatened with strikes and had to make large advances in wages. They were, however, allowed by the government to increase their rates commensurately. Several times since the outbreak of the war they have made further wage advances and have been subjected to other increases in operating costs, such, for example, as are indicated in the circular letter recently issued by the Boston & Albany railroad. In these cases, however, they have not had to increase their freight rates, for the reason that the government has made up all de-

creases in net earnings, and has, furthermore, provided for all increased interest payments. Passenger rates have been advanced, but this was for the purpose of diminishing passenger traffic in order that the roads could be of more effective aid to the government in the conduct of war.

Briefly, the British government has had the good sense to keep the railroads at their highest effectiveness. In one way or another it has compensated them for the losses which rising labor costs and increasing commodity prices and firmer money rates would otherwise have entailed. Before the war, it allowed the roads to increase their rates to the public to counteract the rising cost of operation; since the outbreak of the war it has pursued the opposite policy of keeping the rates to the public intact but making up the deficit to the roads. What will happen to the American railroads if they are not treated with similar good judgment, time will tell.

What has so far happened is clear to everybody. Great uneasiness fills every mind today with reference to our transportation companies. The necessities of life are harder to obtain and are rising in price because of the lack of transportation facilities. As things are at present, it is impossible for the railroads to increase their facilities to meet the needs of the country. The outlook is serious now, and it will be much more serious later in the year unless aid is extended to the railroads. The public is busy trying to discover who is to blame for this situation, with never a thought that the public itself is the chief malefactor.

Some Ignored Facts Regarding Public Utility Rates

On June 6, the New York *Herald* printed an article headed "Edison Company is Trying to Escape Reduction in Rate." The article began in this fashion: "In the face of a pledge made to Mayor Mitchell early in the year that it would reduce the rate of electricity to consumers in New York City beginning July 1, the New York Edison Company yesterday made a formal application to the Public Service Commission for permission to maintain its present rates indefinitely. This application, following closely the demand of the street railroads that they be given financial relief, either by the abrogation of existing transfer orders, or by being allowed to charge two cents each for transfers, literally staggered the members of the

Commission." The mayor immediately announced his determination to contest the matter and a hearing was appointed by the Commission.

Having announced these facts, the New York *Herald* goes somewhat into the history of the case. It tells us that in 1915 the rate for electricity was reduced from ten cents to eight cents per kilowatt hour and that "an agreement was made that this rate should be maintained for three years." Early in 1917, the mayor decided that the rate was too high and asked the Public Service Commission to reopen the matter. This was done, with the result that the Edison Company agreed to an immediate reduction to seven and one-half cents and to a further reduction to seven cents on July 1. "It was expressly stated in the agreement that the reduction on July 1 would be subject to the general condition of business. It is asserted that the latest reports of the company show that the business has never been better and that the basis of the application to be relieved from the promised half-cent reduction is merely increased operating expenses, increased cost of materials, and increased cost of labor. All of these things and war taxation, which is not mentioned in the plea for relief, are regarded by the city officials as incidents of war conditions and in nowise afford an excuse for a refusal to grant the public the promised relief."

The first thing that arrests our attention here is that while an agreement is binding on the part of a public utility, it is not binding on the part of a municipality. The original agreement in this case was for a three-year period, which would not end until 1918. This fact, however, did not prevent the mayor from taking measures to break the agreement, but when a new one was made and the company subsequently found that unexpected changes in general conditions made it inadvisable to keep it, the mayor, if we can believe the New York *Herald*, was filled with moral indignation. "His jaw set, and he said: 'You can say for the mayor and for the city administration that any demand on the part of the New York Edison Company to maintain the present rate and avoid its obligation to make a reduction on July 1 will be fought to the limit.' " Unless there are facts which have not been disclosed, this is bound to strike the reader as not only queer but sinister.

However, it is not the facts of this particular situation that we are concerned about, but some of the general arguments which are advanced in support of them. In this connection,

let us quote from an editorial in the New York *Herald* of the same issue as that containing the facts which we have just cited, entitled, "No Charge for Street Car Transfers." The editorial says: "The advance from five cents to seven cents—amounting to an extra quarter dollar a week to those who must every day ride to and from office, store or factory—would be of great hardship to a multitude of poorly paid toilers, including a great army of working boys and girls. It is true that 'the cost of living' has increased for the street railways, as it has for all other corporations and for individuals, but the railways, with their gigantic income supplied by the public, are in a better position to institute economies than are a majority of those who give up their nickel for compressed standing room in Mr. Shonts' overcrowded cars."

These arguments, which in their essence are identical with those employed in connection with central station and all other public utility rates, would be dangerous enough at any time, but at such a juncture as this they are a positive menace to the welfare of the entire nation.

The points to which we call attention in the passage we have just quoted are these: first, that it is not right and proper to make the consumers of a public utility service pay for the increased cost of rendering the service, and second, that the public utilities can more easily institute economies than can the people who patronize them. Each of these statements is in error.

It is an old saying that "the consumer always pays the tax." It is well that he does, for by so doing he automatically regulates general business both to his own advantage and that of everybody else. If the street railways are allowed to increase their fares, "a multitude of poorly paid toilers" will experience a hardship, for they will still have to go to work, and if they cannot afford to pay the increased fare, they will have to walk. Undoubtedly a very large part of them will continue to ride. Many of them do not come within the scope of the income tax law, whereas probably most of the stockholders of the utility companies do, and in this case the burden of the war will rest proportionately very much more lightly upon the former than upon the latter. At a time when everyone should be glad to make a great sacrifice for his country, is it wise, to say nothing of just, to exempt anyone?

We may, however, ignore sentimental considerations and confine ourselves to an economic survey of the situation.

If the public utilities are able to secure increased rates and the owners as a result to receive their present dividends, the country will be very much better off than if decreased rates are not enforced and dividends consequently not maintained. The tendency of capital to have less and less to do with industries where the margin of profit is shrinking is well known. It is as strong in the case of a public utility as in that of a private industry. A community may derive an immediate and temporary advantage by reducing the profit of a public utility below the point of incentive, but sooner or later it works its own harm. One is reminded of Petroleum V. Nasby's account of socialism at the Cross Roads. The socialists at the Cross Roads decided to begin operations by distributing pro rata the goods in Bascom's store. When they had consumed them, they went back to Bascom and asked him when there was going to be more. His answer was that there was not going to be more.

Consider now the statement that the public utilities "with their gigantic income supplied by the public are in a better position to institute economies than are a majority of those who give up their nickel for compressed standing room in Mr. Shonts' overcrowded cars." In one sense this is true. The public utilities can immediately discharge a great many of their employees, stop buying or repairing cars and central station appliances, and reduce their service generally. But this is not what the public wants. It has no desire to see any working man discharged, or any public utility service reduced. If, however, the public utilities are to employ their present forces and render their present service, they are not going to find it nearly so easy to economize as some persons suppose. In fact, it is not going to be so easy for them as for the persons who buy their service. The public utilities have been practicing close economies for a good many years. They have been forced to do so by the increasing hardships forced upon them by unwise legislation and over-zealous regulation.

There is one fact in connection with this whole subject which most persons have lost sight of. Even if public utilities receive more generous treatment from the public in the future than they have in the past, their situation will still be a difficult one. A few weeks ago Congress voted to issue war loans amounting to seven billions of dollars. Now seven billions of dollars is probably more than the whole annual increase in the wealth of this nation. This means that we shall probably take all our

annual increase for war purposes, leaving, so far as can be seen at the moment, none for the extension and development of general industry. Yet a public utility company in order to render the service which the public demands of it cannot stand still. Extensions and developments are imperatively demanded to keep pace with the increasing population and needs of the community. It goes without saying, therefore, that the public utilities will, during the continuance of the war, have to take from their current earnings practically all the money they need for these purposes.

THE WAR'S EFFECT ON PUBLIC UTILITIES

BY HENRY G. BRADLEE

A little over nine weeks ago, Congress met in special session and declared war against Germany. While this action was expected, little preparation had been made and the nation now finds itself almost overwhelmed by a great number of new and untried problems, all calling for immediate settlement. As might be expected under these conditions, this early period of the war has been one of great confusion and uncertainty. There were no precedents to guide us in matters of business policy or personal action, and until the government made some progress in organizing its forces and outlining its general campaign, there was little to be done beyond following the general progress of events and trying to see where they would ultimately lead.

Fortunately this first confusion is gradually disappearing and we are beginning to see a little more clearly the character and extent of the problem which has been undertaken. There is, of course, much that is still uncertain and indefinite, but two facts seem to be reasonably well established which have a very direct bearing on the operation of public utilities.

These facts are:

First: That the period of the war will be one of great industrial activity with an unprecedented demand for labor, both skilled and unskilled.

Second: That the annual savings of the people, which are ordinarily invested in public improvements and the extension of industrial property, will be largely or entirely required by the government for the prosecution of the war, and little, if any, new capital will be available for such improvements and extensions.

Let us consider these two facts a little more in detail. Under the plan outlined by the government, we propose to divert several million active workers from their present occupations and employ them in ways which will be industrially unproductive. These men will be employed in our army and navy and in the work of government departments and of organizations for war relief. To this extent our regular working forces will be reduced and these men and their families must be supported by the productive work of others. We propose to loan to our

Allies during the next year, \$3,000,000,000, all of which is to be expended in this country for food and supplies required by these Allies for the prosecution of the war. We must provide all of the labor necessary to produce and deliver these supplies. We propose to build cantonments and equip an army of at least a million and a half men (including additions to our regular army and militia) with uniforms, rifles, rapid-fire and heavy guns, ammunition, aeroplanes and all of the other implements of war; we propose to increase very materially our navy and our facilities for coast defense. We propose to increase our merchant ships to the greatest possible extent to counteract the efforts of the German U-boats; we propose to encourage our farmers to plant larger areas and to cultivate their crops very intensively that we may provide food for our Allies as well as for ourselves. Each of these efforts requires labor not merely in small amounts, but on a most extensive scale. This labor can be secured only through increased efficiency, through longer hours of work, through a greater employment of women, and through the curtailment of other activities, particularly the curtailment of unnecessary development work on public improvements. With help from all these sources, it is still probable that the demand for labor will exceed the supply, and unless a determined effort is made to eliminate all unnecessary work, our prosecution of the war may be seriously handicapped.

In the past, industrial activity has been accompanied in nearly every case by an abundance of investment capital, and it has been possible for industry to extend and increase its facilities to meet increasing demands. This is a condition with which we are familiar and which we know how to meet. Now the situation is to be reversed and we have before us an entirely new problem. We are to have industrial activity and industrial prosperity for the laborer and for many industries, but this is to be coupled with a material shrinkage in capital available for development work and for public improvements. The government proposes to raise \$7,000,000,000, during the coming year for war purposes. This money is to be obtained through taxes and the sale of bonds, and heavy taxes and further sales of bonds may be expected during the continuance of the war. England has now been at war for nearly three years, and during this period her average expenditures for war have been a little over \$7,000,000,000 per year. The finances of England and France are already severely strained by the burdens the war

has imposed, and it is fair to assume that the United States must from now on furnish a very considerable part of the necessary "sinews of war."

It is difficult for us to form any clear idea of an amount of money so great as \$7,000,000,000. It is so much in excess of the figures to which we are accustomed that the mind fails to grasp it. From such figures as are available, it appears that this sum is at least equal to, and probably exceeds, the total amount which we as a nation save each year for investment purposes and so add to our national wealth. If this is correct, it is clear that the savings which we should ordinarily apply to the further development of industry and to public improvements must be used to carry on the war and we shall have little, if any new capital available to increase and extend industrial properties unless we can materially increase our ordinary savings through the practice of economy and the reduction of consumption.

Below are some figures taken from tables published in the *London Economist* showing how new capital has been applied in Great Britain during the years 1914, 1915 and 1916. These tables are of particular interest for they show that the extension and development of industrial property has been almost entirely discontinued since the early days of the war except in industries which contribute directly to war requirements. The figures given in the *Economist's* tables for public utilities and for municipal loans are typical, and when converted from pounds sterling to dollars they appear as follows:

Year	New Capital Invested by Great Britain	
	<i>In Public Utilities</i>	<i>In Municipal Loans</i>
1914	\$66,500,000	\$15,500,000
1915	5,000,000	0
1916	600,000	2,500,000

In commenting on these figures, the *London Economist* calls attention to the fact that the investment of new capital in Great Britain is now, and has been practically since the beginning of the war, under the direct control of the government.

We quote from the *Economist* of January 1, 1916:

"With the Treasury exercising a strict control over the capital market, London's functions as money lender to the world have been narrowed down almost exclusively to the raising of money for the direct war purposes of the United Kingdom, the Colonies and the Allies;"

and from the *Economist* December 30, 1916:

"The control exercised by the Treasury Committee over the issues of new capital has had an even stronger effect in the past year than it did in 1915, for apart from the British Government borrowing, and subscriptions in London to the second French loan, only 16 millions [pounds] was raised for other purposes, and of this, 6½ millions was issued by Colonial Governments, so the industrial concerns raised less than 10 millions during the war."

Let us now consider how the business of the public utilities of the United States may be affected by this general situation and what must be done to meet the new conditions.

It appears that we may have for the first time in our experience, and continuing during the entire period of the war, a combination of conditions somewhat as follows:

First: An unprecedented shortage of labor, materials, and supplies, and consequently an abnormally high price for those actually available.

Second: No new capital available for extensions and additions to property.

Third: A condition of general industrial activity and prosperity with consequent demands for additional service.

It is hard to imagine a more difficult combination of circumstances for a public utility, and it will require the combined ingenuity of the utilities to meet this situation successfully and furnish satisfactory service to the public.

The utilities must devise ways and means to hold down their demands for labor and capital, and above all, they must, if possible, find some way to provide for increases in business without making any material increase in plant.

The best methods to be adopted and the changes to be made to secure these results are by no means clear, and can be worked out only after careful study of each local situation. A few considerations, however, can be touched upon at this time.

Within a few weeks, many of the employees of the public utilities may be drawn for military service under the provisions of the selective draft bill. The companies will then have the opportunity to present to the local exemption boards such reasons as they think proper to secure the exemption of any or all from draft. The government has already considered the case of public utility employees and recognizes the im-

portance of maintaining the service to the public. There should, therefore, be no great difficulty in securing exemption for any employee who is really needed to enable a company to give adequate service.

The utility companies should make a careful study of their employees in order to ascertain how each may be used most effectively in making good the deficiencies occasioned by the draft.

The employment of women in the place of men who enter the army or leave for any other cause should also be carefully considered. Experience in England and in Canada shows that women may be employed to great advantage in many departments of public utility work. They have been found particularly efficient, it is said, in some of the lighter mechanical work—for example, meter repairs and adjustments.

In every organization there is a natural tendency toward a steady increase in detailed work. This is the time to cut out all unnecessary detail and devote one's whole effort to essentials. A utility company should make a careful investigation of every department of its work with a view of discontinuing all operations which can be temporarily or permanently dispensed with without loss of efficiency or impairment of service. This investigation should be undertaken promptly, as it may conduce to a rearrangement of work which will preclude the taking on of new employees to replace those drafted or leaving for other reasons.

The increase of one man operation of cars should everywhere be encouraged. In England, women have been very generally substituted for men as conductors, and it is understood that they are also being used successfully as motormen. In this country, the use of the one man car is already started and has demonstrated its possibilities even on large double-truck cars. We are satisfied that all street railways will gradually change to one man operation for most, if not all, of their business, and by so doing will be able to improve materially the service rendered the public. Such change at this time will meet our present needs and will be in line with probable future development. One man operation may, therefore, be considered far preferable to the use of women as conductors.

An effort should be made to decrease the peak demand on public utility plants and to increase the load factor. As the war progresses, the public will obtain a much clearer knowledge

of the needs of the situation, and undoubtedly the utility companies will be able to secure the co-operation of their customers and of the public authorities in their efforts to readjust the demand for peak load service.

This belief has been encouraged by two recent incidents, one illustrating possibilities in the lighting and power field, and the other in street railway work.

The operator of a Canadian electric light and power plant not long ago made the statement that he thought that his power plant was well loaded when the war began, but that during the war he has increased his connected load fifty per cent with no increase in plant capacity.

In Seattle, during the past two years, there has been a very rapid development in the manufacturing district. The company has been able to prevent material increase in peak load on the street railway in this district by securing the co-operation of the manufacturers and arranging for different hours of closing or of changing shifts in different factories.

Unquestionably, similar results may be secured in many directions by a careful study of existing load conditions and of persistent and diplomatic effort for readjustment.

Renewals and replacements will have to be postponed in so far as this can be done without serious detriment to the service and without permanent injury to the property. This should be done because the cost of all such work at this time is excessive and because the surplus which the utility companies are able to accumulate from earnings may be the only fund on which they can draw for absolutely necessary additions to the property.

The construction work now under way should be discontinued in so far as this may be practicable.

Careful consideration should be given to the study of rates charged for public utility service. With the constantly increasing cost of all labor, materials and supplies, general increases in rates may be necessary to permit the public utility companies to carry on the business and serve the public. The companies should be prepared to act promptly and intelligently should such an occasion arise. It is suggested that all future contracts for power, and that renewals of all existing contracts should contain a clause providing for a readjustment of the rate with changes in cost of fuel. The rate written in the contract should be based on a normal average fuel cost and adjust-

ments made from this point as the price of fuel increases or decreases. It must be borne in mind that the price of fuel is largely dependent upon the general market price of labor and materials. It is, therefore, fair to assume that an increase in the price of fuel will be accompanied by a similar increase in general labor and material costs and provision for this should be made in the adjustment of the power rate.

The necessity for an increase in street railway fares is now being urged in many sections of the country and the public are beginning to realize that some readjustment must be made or service will be seriously impaired. Figures recently prepared show that increases have already occurred in the case of at least thirty-six street railway properties and are being publicly discussed for many others.

We are facing a situation which is country-wide, in fact, world-wide, and completely beyond the control of the public utility companies. The aim of such companies during the war should be to manage their properties in the way that will be most helpful to the national government and that will give the best possible service to the local public consistent with national duty and the restrictions imposed by war conditions. In working along these lines, the public utility companies should have the cordial support of everyone.

It is to be hoped that city and state officials will appreciate the importance of conserving labor and capital in the interest of our national requirements and, following the example of England, will postpone bond issues and local public improvements during the period of the war.

THE PUBLIC UTILITY HOLDING COMPANY*

BY G. E. CLAFLIN

A holding company is a corporation owning the stock of one or more other corporations (which we may call operating companies) and thus controlling and directing the management of those operating companies.

The subsidiary operating companies of a holding company may be engaged in almost any line of business, but they can usually be classified as either industrial, commercial or public utility companies. Holding companies likewise may be classified as Industrial Holding Companies, Commercial Holding Companies or Public Utility Holding Companies, depending upon the class of business transacted by their subsidiary operating companies.

We are to discuss only the Public Utility Holding Company today, but it is very important to understand clearly certain radical differences between the Public Utility Holding Company and the Industrial or Commercial Holding Company. This difference is due to the fact that the subsidiaries of industrial and commercial holding companies are inherently of a competitive nature while public utility companies are not competitive. The product manufactured or the goods sold by industrial or commercial companies are or may be marketed in competition with the product or goods of other similar organizations. It is evident that a holding company owning a sufficient number of subsidiaries in any industry might be able to so manipulate the operations of its subsidiaries as to control the market in that line and fix the price of that commodity. Such action if applied to those commodities which are necessities of life might seriously affect the business of the country besides causing much suffering and many hardships to the people. This danger has been recognized and so-called anti-trust laws have been placed upon our statute books forbidding a monopoly in restraint of trade.

Contrast now the conditions surrounding the Public Utility Operating Company. A public utility supplying a community must first secure the consent of the public to occupy the streets with its tracks or pipes or poles and wires. It cannot do business otherwise.

In granting such rights the people reserve through their

*Address before the Graduate School of Business Administration, Harvard University, May 2, 1917, by the vice-president of the Electric Bond & Share Company.

representatives, the Public Service Commission, full regulative authority over all the business of the Utility. Its accounts must be kept in accordance with the rules of the Commission and its annual detailed report is a public document and open to every one. Any customer can complain to the Commission as to any act or rate of the Utility and secure action. Under such control and supervision competition would be of no advantage to the public and in fact would be a disadvantage through the duplication of investment as well as of poles and wires or pipes in the streets. It is now universally acknowledged that these Public Utilities are natural monopolies, and that while they should be regulated they should also be protected from competition, for the general good of all, and all but two of our states now have such laws in force.

Since ~~each~~ Utility is regulated by the Public Service Commission of the state in which it is located, it follows that no Public Utility Holding Company, no matter how large and powerful, can manipulate the rates charged by its subsidiaries. Rates can only be changed with the approval of the Commission and then only after due notice to the public with opportunity to protest. It is impossible, therefore, for the Public Utility Holding Company to so operate its subsidiaries as to cause hardship to the public. For this reason it is free from the serious objections inherent in those holding companies which are of a competitive nature and the Public Utility Holding Company must not be classed with them.

Whatever may have been the reason for the organization of other holding companies, the Public Utility Holding Company has successfully met and supplied a real need and played no small part in the development of public utility service and indeed in the development of this country.

The public utility holding company through its organization of trained experts secures to its subsidiaries those benefits of centralized management in engineering, purchasing, accounting and management, which you have already discussed in previous lectures. These advantages, however, might be obtained by a centralized management which had no interest in the stocks of the operating companies.

They are an important service rendered to the subsidiaries by the Holding Company but of much less value than the financial help which the company gives.

In order to understand the importance of this financial

service we must understand some of the principles underlying the financing of a public utility. These principles are quite different from those controlling commercial and industrial business, but must be recognized if success is to be obtained, and we must therefore discuss them in some detail.

The service rendered by our Public Utility Companies is a relatively recent advance in our civilization. In the case of the telephone, the electric light and the street railway, practically all this development has occurred within the present generation. In the early years of the electric light and power industry the plants were small and the relatively high cost of the plant and service retarded the growth. As improvements were made and the installations increased in size and extent of service, the promoters discovered that something was wrong with their financial plans.

This first came to my attention about 1891 in a small town in Illinois where I had installed a 500 light central station plant. After the plant had been in operation for some time I was recalled to advise regarding a considerable further increase in plant capacity. The business had grown and some increase of plant had already been made, but still more capacity was needed.

This little electric light company had been financed by a group of local men who had taken the stock of the company to an amount sufficient to make the first installation. They then expected the earnings of the property not only to pay good dividends on this stock but also to pay for the extensions of the property necessary to supply the growth of the business.

On my return the manager, whom we may call Mr. Brown, told me of the growth of the business and the need of more capacity. But, he said, I don't understand this situation. Our books show that our net earnings represent a good return on our capital, but it takes all of these earnings and more for equipment and material to take on the new customers. We have increased our plant and extended our lines and have taken on the business. Our earnings show a fine increase, but they have not been sufficient to pay for the necessary material and equipment, and we have a loan now at the bank and still need more money. We have paid no dividends and are in debt, and all this in the face of the fact that our books show that we are making money. My partners say that the more business we do the worse off we are and I don't understand it. This was a dis-

turbing situation and a problem which I could not then solve.

Now we know that Mr. Brown was ignoring three important principles of public utility finance, and because his company was attempting to do business on principles which apply to commercial business and do not apply to Public Utility business, he was in real trouble. These three principles were:

First. That a public utility is a growing business requiring continually increasing amounts of money for additions and extensions of its plant and property.

Second. That these expenditures are for permanent improvements and that the investment is therefore permanent, so that the money cannot be provided by short-term loans.

Third. That the total net earnings of the property are not sufficient to provide the increased plant and equipment necessary to serve a rapidly growing business, to say nothing of the interest or dividends which investors and stockholders insist upon having.

We learn by experience and it has only been as the result of hard experience that we have learned that a correct financial plan is perhaps the most important element in the success of a public utility.

Let us examine further the three principles which I have just mentioned. The first of these principles was:

First. That a public utility is a growing business requiring a continually increasing amount of money for additions and extensions of its plant and property.

As an illustration let us consider an electric light and power property. Experience shows that, except in communities where population is actually decreasing, there is a continually increasing demand for electric service. We used to discuss the question of the maximum amount of service which a given city would demand and assume that when this point was reached the growth of business would depend upon the growth of population. This we called the point of saturation. That idea has long ago been discarded, for we find that new uses are continually being found for electric energy and each new development seems to bring others and the end is not in sight.

The public utility in accepting its franchise assumes a public duty to furnish a good and reliable service and to supply all reasonable demands. It must therefore be prepared to pro-

vide the plant and equipment to fulfill this public duty. This involves a financial plan which will furnish the funds when and as needed.

If the company cannot or will not meet the demands of the community for service it will have to face competition, either from another corporation or possibly a municipal plant. The public will not take excuses.

An examination of the property and accounts of an electric light and power company will show that on an average, a company which has been operating for several years and which has a gross income of say \$200,000 per annum will have invested in its property approximately \$1,000,000.

The amount of this investment will vary with the conditions under which the property was constructed. The investment will be larger where the power plant is a hydro-development at a distance from its market than if it is a steam plant and near the center of distribution, or if the distributing system is largely underground instead of overhead.

These and other conditions may make the ratio of investment to gross earnings as low as four or as high as seven or eight to one. Let us assume five as a reasonable figure for our illustration.

In making additions and extensions to the property and to the power plant in particular, it is impractical to install units of exactly the size to supply the expected growth of a single year. This would be poor engineering as well as poor business judgment. The additional installation is made after careful study of the situation with a view to future growth and economy of operation. This usually results in the installation of considerable excess capacity over the immediate requirements of the business. For this reason we find that over a period of years there are some years in which relatively large investment is made followed by other years in which the amount of funds required is relatively small. It is interesting to note, however, that over a period of years' experience shows that the ratio of increased investment to increased gross will remain approximately continuous, or 5 to 1 in our case.

The increase of business will, of course, vary with communities and conditions, but a 10 per cent increase in gross earnings per year is an ordinary growth.

In our illustration we assumed a gross of \$200,000. A 10 per cent increase would therefore be \$20,000 and on our ratio

of 5 to 1 it is necessary to expend in improvements and extensions of property \$100,000 largely during this year, in order to provide facilities to serve this \$20,000 additional business next year. Now, if the rate of increase of business continues to be 10 per cent, which is not at all unusual, you will see that the amount of increase in the second year is \$22,000, in the third year \$24,200, and so on in increasing amounts. In the same way the funds required for the extension of this property will be \$110,000, in the second year, \$121,000, in the third year, and in increasing amounts thereafter.

Our financial plan, therefore, must provide money in increasing amounts from year to year as needed to furnish the facilities to enable the company to serve the public.

The second principle which I mentioned was,

Second. That the expenditures for plant are for permanent improvements and that the investment is therefore permanent, so that the money cannot be provided by short-term loans.

Our public service company with an investment of \$1,000,000 had gross receipts of \$200,000 per annum. A comparison of these figures with those of a commercial business shows a surprising difference. A commercial business having an investment of \$1,000,000 which does not show an annual gross of \$6,000,000 is unusual and the figure is frequently much larger. In this case the merchant is said to have turned over his capital six times during the year. Our lighting company on the same theory has turned its capital one-fifth of a time in the year. The merchant therefore turns his capital thirty times as fast as the utility, which it must be prepared to furnish on demand without notice.

The explanation is that the merchant is handling commodities while the utility is furnishing a service. It is important to understand this difference clearly.

The merchant can often buy goods on two or four months' time or longer, with the possibility of selling these goods at prices which cover their cost, plus expenses, plus a profit, and thus have the proceeds in hand to pay his bills when due. In other words, the merchant can do business largely on capital borrowed and repaid at short intervals because this money is invested in commodities which are rapidly handled and when sold return not only their cost but a profit over expenses.

The electric lighting company, on the other hand, is furnishing a service which it cannot manufacture in advance, but

which it must be prepared to furnish on demand without notice. It cannot ask one customer to wait while another is being served. The service must be rendered when the button is pushed.

To prepare for this service the Lighting Company constructs its plant and lines and installs its meters. The customer, however, does not purchase any of these things upon which the lighting company has expended its money. The customer wishes and pays for electrical energy and all of the investment made by the electric lighting company must be and remain in place in order that this customer may continue to be served. The investment, therefore, is permanent.

Our financial plan, therefore, must provide money on a basis which requires repayment, if at all, only after a long period of years when it can be refunded.

The third principle which I mentioned is:

Third. That the total net earnings of the property are not sufficient to provide the increased plant and equipment necessary to serve a rapidly growing business, to say nothing of the interest and dividends which investors and stockholders insist upon having.

In the case of the merchant whom I mentioned with his annual turnover of six times his capital per year, the only limit upon the profits which he may make is fixed by competition with other merchants. If, however, he is a skillful buyer and a good salesman and by economies on the one hand, and on the other by increasing his turnovers from six to perhaps nine per year and thereby largely increase his net profits, there can be no objection by anyone.

The public utility, however, is limited by law to a reasonable rate of return upon its investment. This reasonable rate is fixed by the Public Service Commission, and practically is the lowest rate which will induce people to undertake the construction and operation of these utilities.

It should also be remembered that if the management by its skill and good judgment is able to so operate its property that the return is increased above the figure set by the Commission, it is not allowed this reward for its good work. The Commission will lower its rates for service sufficiently to reduce its rate of return to the figure which they had fixed. In other words, the management is penalized for its good work by having its rates reduced and the public gets the full benefit. This is one element in the present method of regulating public utilities which is unfair and should be changed.

The rate of return has been fixed by some of our commissions at 8 per cent. That is to say, the utility may charge such rates for its service as will produce, after payment of operating expenses, taxes and reasonable reserves for depreciation, etc., net earnings equal to 8 per cent upon the value of its property.

In our illustration the electric lighting company was assumed to have an investment of \$1,000,000 and a gross income of \$200,000. By careful management this property might operate on a 60 per cent basis, or in other words the operating expenses and reserves might perhaps be kept down to 60 per cent of the gross or \$120,000, leaving net earnings of \$80,000, which is 8 per cent on the assumed investment.

We have previously assumed that this property is growing at the rate of 10 per cent per annum and that we must immediately spend \$100,000 for facilities to serve the \$20,000 of new business which we will have offered to us next year. Our net earnings are \$80,000 and we need \$100,000 for extension of our property.

Our total net is less than our requirements for this year's extensions and we know that the situation will be the same next year and every year that our business continues,

We must therefore have a financial plan which will continually provide additional money from outside sources because our earnings are insufficient and must be used to pay interest on the capital used.

We must therefore go into the general investment market for our money and the securities which we produce and attempt to sell must stand the tests which careful investors have learned to use on all investment securities.

In order to sell our securities we must satisfy the investor on five essential points. These essentials in the order of their importance are:

1. Safety of principal
2. Certainty and regularity of return
3. Market ability
4. Amount of yield
5. Possibility of enhancement in market value.

Safety of principal is of first importance, but in the loaning of money there are degrees of safety of the principal and to a considerable extent the rate of interest is an index of relative safety.

United States 3 per cent Government bonds sell at 99 to

par in the market while we find 5 per cent Public Utility bonds selling at varying prices from par down to perhaps 70 per cent of par, depending upon the condition of the company and its business, which in other words means the estimated safety of the investment and the certainty of the interest being paid regularly.

An investment which cannot be easily and quickly sold is less attractive than another which, because of its marketability, can be sold by merely telephoning your banker to sell. This is true even if the first is a safer investment than the second, because in an emergency the investment which cannot easily be sold is useless. Banks will not accept such securities as collateral for loans because if the loan were not paid the bank could not sell the collateral to save itself from loss.

Now we have seen that the Public Utility may be allowed to earn 8 per cent on its property value. Our financial plan therefore must produce the money at a cost of less than 8 per cent if we are to have anything left after paying interest charges to compensate us for our time and skill in managing the property.

Interest rates are lowest on first mortgage bonds because under a carefully drawn mortgage the safety of the investment is well guarded.

We will therefore mortgage our property and issue first mortgage bonds. Of course, we cannot issue bonds to the full cost of the property because no one cares to make a loan to the full value of any property. We can, however, issue bonds to about 80 per cent of the value of our property. These bonds will be considered by the class of investors which demands safety of principal and interest rather than rate of return. These are people whose only income is derived from their invested capital, so that if the capital were lost their income would cease. Our bonds, therefore, will be studied with great care by such people and the price which they will pay for them, if they buy at all, will depend upon the showing of safety and stability which we can make.

There is another class of investors which is willing to take a little more risk provided they get a higher interest rate to compensate for the increased risk. To meet this situation we will get out some preferred stock bearing 6 per cent or 7 per cent dividends. If our property is well managed we will be able to secure practically all of our money through the sale of bonds and

preferred stock and at a cost of between 6 per cent and 7 per cent.

On this plan and having a good record of growing earnings and of good relations with the public which we serve, we can continue to issue and sell bonds and preferred stock year after year to provide for the requirements of our growing business.

In actual practice securities are not sold by the Utility Company directly to the investor except in rare cases and in limited amounts.

The business of selling investment securities is highly specialized. The investor has not the time or facilities for assuring himself that the bond or share of stock which is offered to him is a safe investment. He also could not afford the expense involved in such an investigation.

This is the business of the investment banker as a distributor of investment securities. He must investigate all of the business conditions surrounding a public utility, including the local public sentiment, examine the physical property and estimate its value, check up all legal details connected with the organization of the company and the validity of its franchises and assure himself that all legal technicalities have been complied with in the issuance of the securities which he is asked to purchase. This requires a competent organization and involves much time and expense.

When the banker has completed such an examination and has purchased the securities, he is able to send out his salesmen armed with the statement that "we have checked up all these points as to safety of the investment and future possibilities of growth of property and recommend these securities for investment." The investor thus gets the benefit of an independent examination and report on the property.

The reputation and continued success of the banker is dependent upon the character of the investment securities which he recommends and sells to his clients. He must therefore use care and good judgment in selecting his securities if he is to retain his customer.

Our Utility must therefore endeavor to place its securities through some banker. The banker, like any other merchant, must be careful to buy only such goods as he can sell, and must also consider the cost of selling. This cost must include the cost of the legal, technical and business investigation which I have mentioned and which, as made by careful reputable bankers, is

expensive. This cost will be the same in any case whether the bond issue at the time is \$100,000 or \$1,000,000 or more. It is clear however that the cost per bond will be ten times as much if the issue is \$100,000 than if it is \$1,000,000, which is a very serious difference. On the smaller issue this would mean that the banker must buy the bonds at a correspondingly low price, if at all, in order to sell at a profit because the selling price must compare with other similar securities in the market.

The banker, therefore, will not only apply to the securities of our Utility the test of the five essential points which I have mentioned but will consider the size of the issue and cost to investigate the situation. If our district has more than 100,000 population and our property will warrant the issue of several millions of clean first mortgage bonds the banker will be much interested. But if we must mention a smaller issue of bonds and a smaller population served, we will not find such a cordial reception.

When cities reach a population of more than 100,000 there seems to be a certain force or momentum which insures a continuing growth. Below this figure the doubt increases and security values decrease, except in certain cases where local conditions change the rule.

Consider now the condition in cities of say from 10,000 to 50,000 population, of which there were 489 in this country in 1910. The cost of plant required to serve such cities is not large and the bond issue in such a situation would ordinarily be small.

If a security issue on a utility in some good city in this class were offered to an investment banker he would probably say, if he took the time to explain his experience:

"I doubt if I could sell those bonds. Our investors are afraid of small cities. Your present growth, while very good, may be the result of special conditions and your population and earnings may be less in 1920 than they are today. We have had some experience with situations of this kind and your town is not big enough for us to be sure that its growth is stable. Your issue is small and hard to sell because our investors like a large issue, so that there will always be more or less buying and selling of the bonds. This gives them assurance of quick market and makes the bonds good collateral because they can be turned into cash without trouble or delay. Our people would also wish to buy such a bond if at all on a relatively high interest yield, and on account of the cost of investigation you would have to sell to me at a very low price."

This price, if the banker ever got so far as to name it, might easily mean a rate for the money which was higher than the utility was allowed to earn.

As a matter of fact the banker would probably say at once, "I can't sell such securities You will have to finance that situation locally."

This is exactly what has happened in a great many cases.

The securities of utilities serving the smaller communities cannot be sold in the investment market. Such utilities, therefore, had to be financed locally and generally passed through reorganizations with loss of money to investors, because they failed to meet the demands of the community and perhaps suffered loss of business through competition. The old plans of financing such Public Utilities failed to meet the requirements.

The Public Utility Holding Company form of organization and finance has successfully met these conditions and has developed many situations which must otherwise have failed.

The financial plans of Public Utility Holding Companies vary somewhat, but in general are based upon the sale of the Preferred and Common Stock of the Company. Additional funds are sometimes secured from the sale of Collateral Trust bonds, which are issued against certain bonds of subsidiaries deposited with a trustee as collateral. Long-term debentures have also been sold. These last are unsecured except by the credit and general assets of the company.

The assets of the Public Utility Holding Company consist of the securities of its subsidiaries, and its income is principally derived from the interest and dividends received on these securities.

In the case of the small subsidiaries, the Holding Company must usually hold all of their securities and must furnish additional money to them as needed in return for additional securities.

The bonds and Preferred Stock of the larger subsidiaries can be sold to the public and the Holding Company will retain the Common Stock. Sometimes the bonds of even a small subsidiary can be sold because of the knowledge that the Holding Company owns the equity in the subsidiary and will carry it through any trouble. Such sales are really made on the credit of the Holding Company.

The Public Utility Holding Company is not subject to the control of any public regulating body, but its securities must be

sold in the investment market in competition with all other securities. The same tests will be applied to these securities as to others, but the stocks of the Public Utility Holding Company have an element which is important in the questions of safety and of continuity and regularity of the return.

This is the element of diversity, which results from the fact that its subsidiaries are located in different sections of the country. This averages the risk, because unusual adverse conditions are not likely to occur in all sections of the country at once. This principle of diversity and of averaging the risk is the basis upon which our insurance companies operate.

It is an old saying that nothing is certain except death and taxes, and yet life insurance is a safe and stable business. Likewise, fire and accident insurance. It is the averaging of the risk over a large number of individual cases which gives this safety. In the same way, a bank having 5000 deposits of \$1000 each is able to loan safely a definite percentage of this total, whereas if it had but one deposit of the same total amount it could not safely loan any of it because the one depositor may at any moment call for the full amount of his deposit.

The Public Utility Holding Company with a number of subsidiaries located in widely separated cities gets the full benefit of diversity. This is especially true where the general business of the several communities in which its subsidiaries are located, is based upon different industries. Thus if the subsidiary located in the Pacific Northwest shows no growth, because the lumber business upon which that community depends is languishing through lack of shipping, the subsidiary in Ohio or Pennsylvania where the steel business is booming, or in Nebraska or Texas where grain or cotton are commanding high prices, will hold up the combined earnings.

This is brought out very clearly by a tabulation of the monthly earnings of the individual subsidiaries of a Public Utility Holding Company, compared with a similar tabulation in which the monthly earnings have been combined. These tabulations are made up with comparative columns so that the earnings for each month of any year are compared with the same month of the preceding year. Where the earnings for the month of the present year, as for instance April, 1917, are less than April, 1916, the reduction is shown in red, and of course these red figures where they occur are very prominent among the black figures.

The tabulations of earnings of the individual subsidiaries may show these red figures for certain months or periods, due to various local causes such as labor troubles, high cost of fuel, business depression in that district, reduction in the companies' rate schedule, etc.

When earnings of all subsidiaries are combined, however, these red figures disappear, the good business in some districts having offset the poor business in other districts. This is the effect of diversity.

The combined earnings over a period of years may not show a uniform rate of increase but they do not show any set-backs. It is this stability which interests investors, and the longer this record the better the credit of the Public Utility Holding Company.

Improving credit means increasing safety of investment and therefore lower interest rates. Business troubles in the district served by a subsidiary may at times make it very difficult for that subsidiary with its decreasing earnings to sell its securities to the public or even to make short-term loans. The credit of the Holding Company, however, will not be seriously affected and it can secure loans and help its subsidiary and usually at much lower interest rates than the subsidiary could have secured.

These advantages accrue to the large as well as the small subsidiaries and have often proved of great importance.

The question is sometimes asked why could not all these subsidiaries be consolidated into one large corporation and gain all the advantages of credit, volume of business and diversity which are claimed for the Holding Company and its subsidiaries.

Where the properties are located in one state this can be done and very often is done, especially where the properties can be physically connected.

The consolidation of a number of properties located in different states and subject to different Public Service Commissions is impractical, because of the varying forms of accounting and other requirements of the different commissions.

The Public Utility Holding Company often consolidates several small subsidiaries located in one state into one large company. It may purchase one or more small properties and by connection and further additions build up a single large subsidiary. I have in mind a case of this kind where the original property had at the time of purchase approximately \$217,000

gross per annum and operated about 300 miles of transmission and distribution lines. This situation in less than five years has been enlarged through purchases and extensions so that today it operates more than 1600 miles of transmission and distribution lines and has a gross of more than \$4,526,000.

Some of the small properties which were purchased were not giving day service and were charging higher rates than are in force today, and several were in serious financial condition. The people of those localities are today getting better service than before the consolidation and almost every farmhouse now has electric lights and an electric range in addition to power for all purposes. This result was accomplished through a holding company and I question whether it could have been done in any other way.

The Holding Company because of the volume of business represented by its subsidiaries is able to command the best of executive, financial and engineering ability, and its large purchases of material and equipment enable it to secure the most favorable prices.

These facilities and its credit enable the Holding Company to develop the business of the subsidiaries to the best advantage and quickly to mobilize men, material and money to meet an emergency.

The managers of the local subsidiaries are not worried as to how they can secure funds for necessary extensions, but on the contrary are continually urged by the Holding Company management to make all extensions which will secure paying business. Under this plan there is practically no limit to the money which can be secured for extensions to the property, provided only the extensions produce the rate of return permitted by the Public Service Commission.

This condition results in an active search for new business by the subsidiary. The utility is not only ready to serve the ordinary demands of its community but is seeking new uses for its output and is foremost in efforts to secure new industries and build up the community. The benefits of this policy are mutual, for it results not only in the growth of the company but also in the growth of the community and in the improvement in living conditions brought about by the many convenient and useful household appliances which are made available to all.

The Holding Company benefits, because the small subsidiaries grow into large ones and are able to sell their securities

on the investment market. This not only relieves the Holding Company from the burden of financing these subsidiaries and thus enabling it to acquire others, but their increased stability has improved the credit of the Holding Company itself so that it can obtain money more easily and at lower rates.

The independent companies acquired by the Holding Company are sometimes operating at a profit, which, however, can be increased by the ability of the central organization. For the most part, however, the acquired properties were in, or on the verge of, trouble caused by their failure to recognize the principles of Public Utility finance which I have mentioned. They must be re-organized and often partially reconstructed before they can be successful either physically or financially, and this may mean a considerable period when earnings are insufficient to cover expenses and fixed charges. The property must be carried through this unproductive period and the Holding Company method readily accomplishes this.

The Holding Company form of organization has had a rapid growth, which seems destined to continue. It has been estimated that the total capital employed in Electric, Gas, Street and Interurban Railway Companies in this country is in excess of eight billion dollars. Of this capital about 70 per cent is controlled by Holding Companies. In the case of Electric Light and Power Companies only, the Holding Companies control more than 76 per cent of the capital employed.

But the mere organization of a Public Utility Holding Company does not insure its success. Integrity, good judgment and experience are just as necessary for success in this as in any other business.

Public Utilities to be successful must so conduct their business as to deserve and acquire a favorable public sentiment. This is something which it takes years to build up but which may be lost in a day by wrong policies towards the public. The customs and characteristics of the people vary in different sections of our country and the Holding Company management must recognize these differences and provide a local management which will fit the local conditions and develop a feeling that the utility is an important part of the community and working for its development.

The growth and success of the Public Utility Holding Companies show that these principles have been realized and also that these companies fill an important place in the development of our country.

FORESTRY IN THE UNITED STATES*

The forest movement in the United States, like all great developments in the advancement of civilization is essentially one of evolution. When the first colonists came to found their homes in the New World, they found a land clothed with forests. These original forests of the United States covered almost a billion acres or almost one-half the total area of the United States, not including Alaska. They contained timber in quantity and quality unexcelled in any place in the world. So extensive were the original forests that the settlers thought they were illimitable, hence no thought of any necessity to be economical in the use of wood arose in the minds of our forefathers. Furthermore, the forests harbored the savage and the wild beast, enemies of the pioneers, and the trees were obstacles in the way of plows, so at an early date, men began to destroy the forests. Such destruction, when carried on without heed to the future, results in some of the most desolate landscapes imaginable.

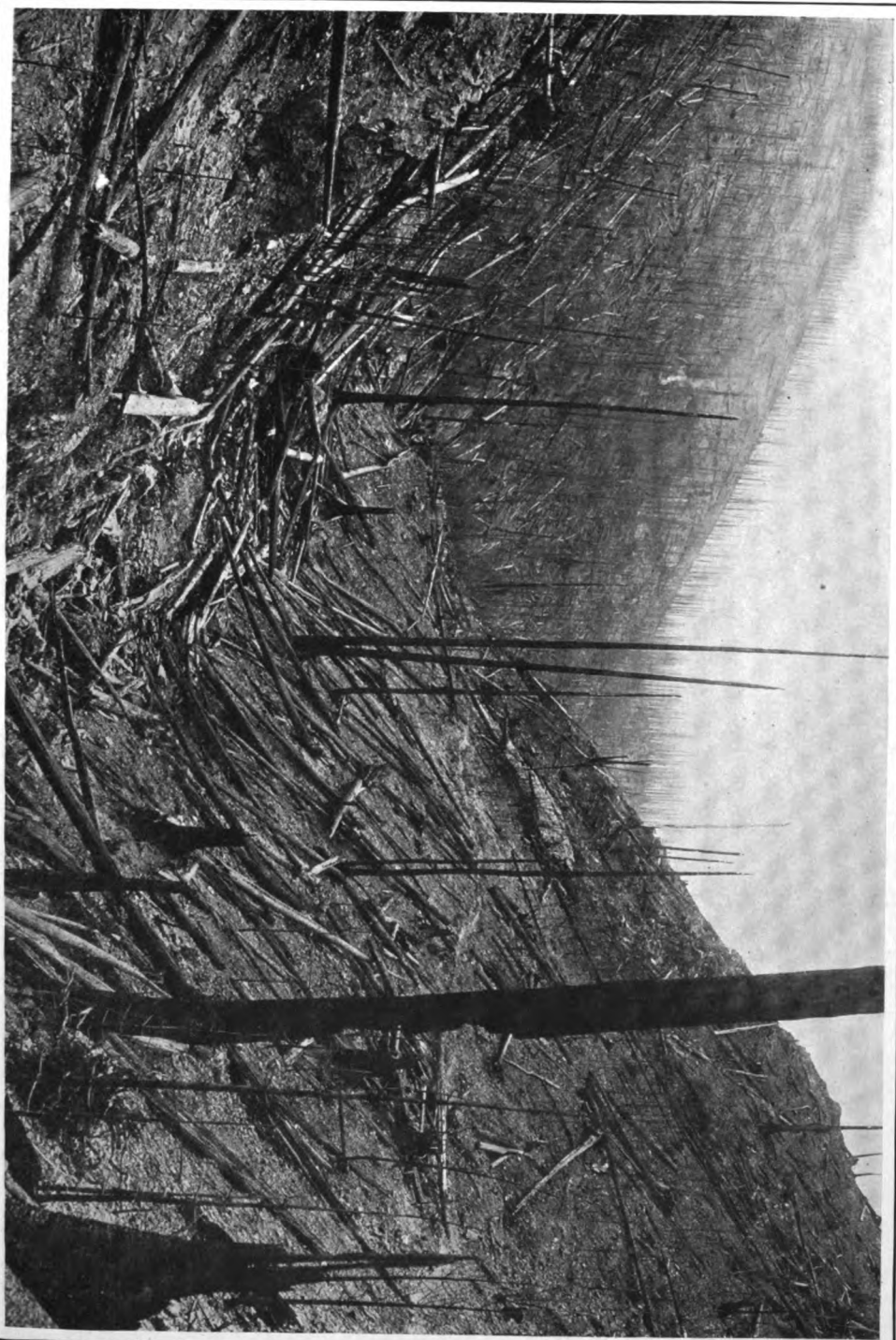
As the tide of immigration swept out into the region of the Great Lakes, men found there great forests of white pine (Plate I), the most desirable commercial timber of all the species found in the United States. These forests represented untold wealth for the lumbermen. It is an unfortunate fact, however, that after white pine has been cut off, that it will not naturally reproduce itself, but instead a thick growth of less desirable spruce and fir will usually spring up to replace the original white pine forest. Soon the lumbermen were on the field, and the great, clean pines that had been centuries in growing began to fall before the woodman's ax. Sawmills sprang into existence here and there all over the great area, and each spring the rivers were dark with millions of logs. Lumbering towns sprang up like mushrooms over night. Almost before men were aware of it, the splendid forests of white pine that had seemed inexhaustible began to give out. Whole counties, once heavily wooded, were laid bare. When no timber remained to feed the saws, the mills became idle. Since no employment was left for

*Lecture delivered before the High Tension Club at Keokuk, Ia., March 21, 1917. Photographs, slides and syllabus of lecture furnished by United States Forest Service, with the exception of a few slides furnished by Mr. F. J. Venning, president of the High Tension Club.



Following the hurricane and fire of August 30, 1910, on the Coeur d'Alene National Forest, near Wallace, Idaho

PLATE II



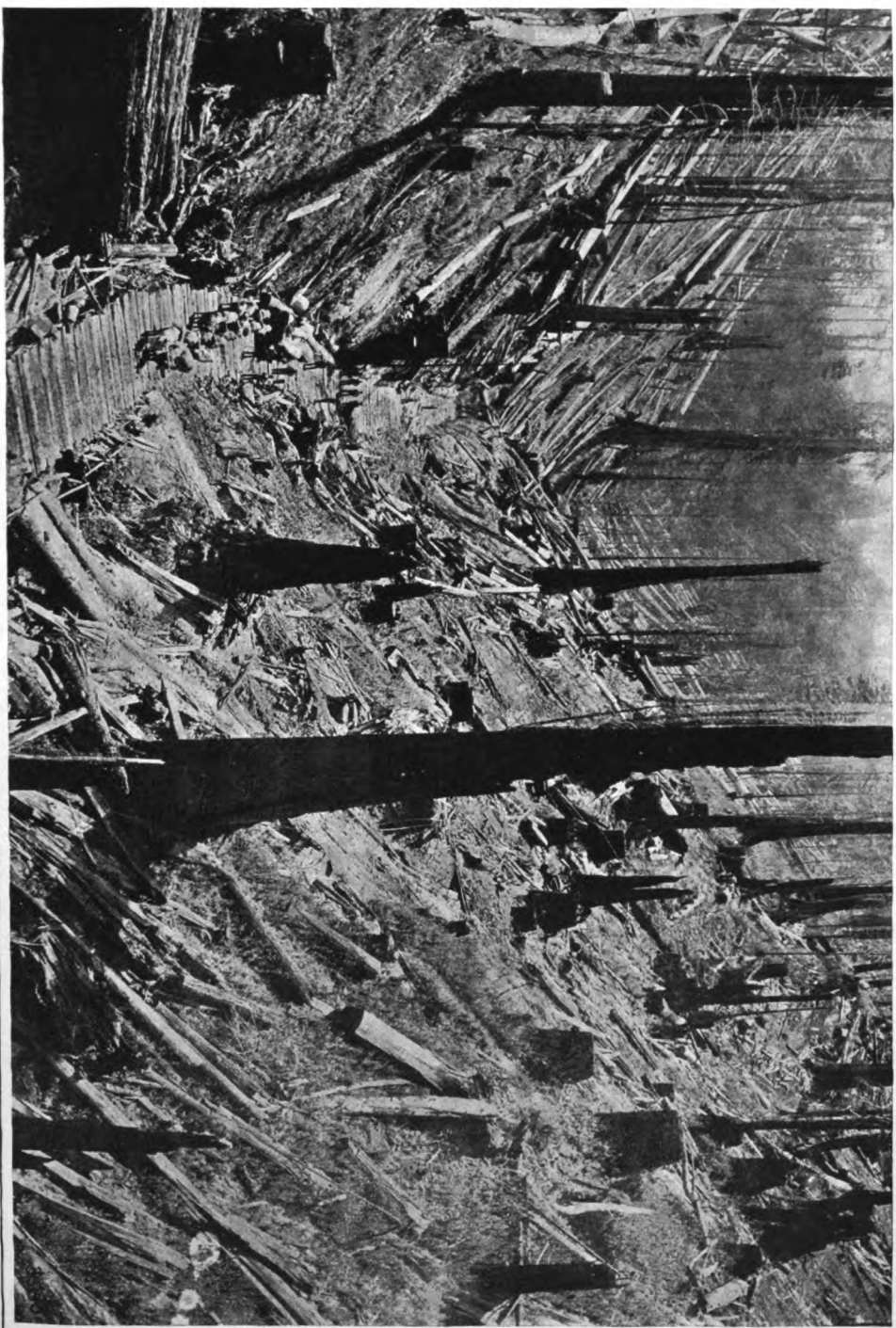


PLATE III
Destructive lumbering in the Coast Redwood Belt, Humboldt County, Cal.

their citizens, the mill towns were abandoned. So men began to perceive that if the supply of wood were to be perpetuated, something must be done.

At the same time, other agencies were at work aiding in the destruction of the forest. Of these destroyers, forest fires were the most rapacious. With the development of steam power in the mills and logging railroads, and the spread of settlements, the fire hazard yearly increased. Great tracts of timberland were turned into desolate wastes each year because of fires (Plate II). The effect of fire is more destructive on some kinds of trees than on others, resinous trees in particular being readily destroyed. This results in very irregular shapes of burned over areas and tends to increase the speed with which new growth will spring up.

Other minor agencies in the destruction of the forests occur in mining regions. In some parts of the country the encroachment of sand dunes renders the land unfit for cultivation and in time destroys whole forests. Various means are used to prevent the encroachment of these sand dunes. For example, in the Colorado National Forest, near Mountain Pass in North Park, the sand is held in place by ground cherry and other plants. In the province lands on Cape Cod in Massachusetts beach grass plantations are used as an aid to protect against the encroachment of sand.

After the pioneer settlers had made their way beyond the borders of the eastern forests and upon the treeless plains of the Middle West, they began to appreciate just what lack of forest trees means, both because of the inconvenience of doing without wood and because of the desolateness of the landscape. So men began to talk about tree planting and plan for saving the forests. Thus, attention was drawn to the lack of any definite forest policy in the United States. Until about twenty-six years ago, the forests on the public domain, the timber of the Rocky Mountains and the Pacific Coast ranges, seemed in a fair way to be destroyed eventually by fire and reckless cutting (Plate III). Nothing whatever was being done to protect them or even to use them in the right way. They were simply left to burn or else to pass by means of one or another of the land laws into the hands of private owners whose interest in most cases impelled them to take from the land what they could get easily and move on. Had this destruction gone on unchecked, there would in the end have been little timber left in the West either

to burn or to cut. More than this, the destruction of forest cover in the watersheds supplying hundreds of streams which rise in the western mountains would have had its certain effect on stream flow,—low water or no water at all during the long dry periods and destructive floods after heady rains. This, of course, would have meant disaster to the irrigation systems and would have seriously hampered electric power development.

Beginning with 1891, however, the present system of National Forests came to be established, the purpose being first to provide for the perpetuation of the forests by insuring their renewal and continued growth; and second, to protect the rough lands on which they are situated from destructive erosion and to promote the regulation of the flow of streams which have their sources amid the forest-covered hills. On January 1, 1916, there were in the United States and its colonies 168 National Forest areas, containing more than one hundred and fifty-seven and one-half million acres, or about one-sixth of the total area covered by the original forests of the United States, or nearly one-twelfth of the total area of the United States (Plate IV). Practically all the forest reserves are in the western third of the country, a few areas are located in the Central States and the recent Weeks Law provides for the gradual acquisition of areas in the Southern Appalachians and in the White Mountains of New Hampshire.

In order to understand the forestry movement, it is necessary to know just what forestry means. First, some things which it is not: It should not be confused with the handling of city or individual trees—"tree doctoring," for example. Strict forestry has very little to do with individual trees, but deals rather with the forest as a whole. Furthermore, forestry must not be confused with landscape gardening. Most foresters have a deep appreciation of landscape beauty, but in the final analysis the viewpoint of the forester is economic rather than aesthetic. His work is to make the forest *pay* rather than to make it *beautiful*. Neither is tree planting all of forestry. It is only a very small part of forestry, and only practiced when the forester is unable to make the trees reproduce by seed or sprouts.

It has often been said that forestry is the science of handling the forest for profit. By this is meant not the immediate conversion of the trees into cash, but the policy of so managing the forest as to make it capable of producing a sustained yield from year to year. The ordinary lumberman seldom looks beyond

Map showing National Forests of the United States



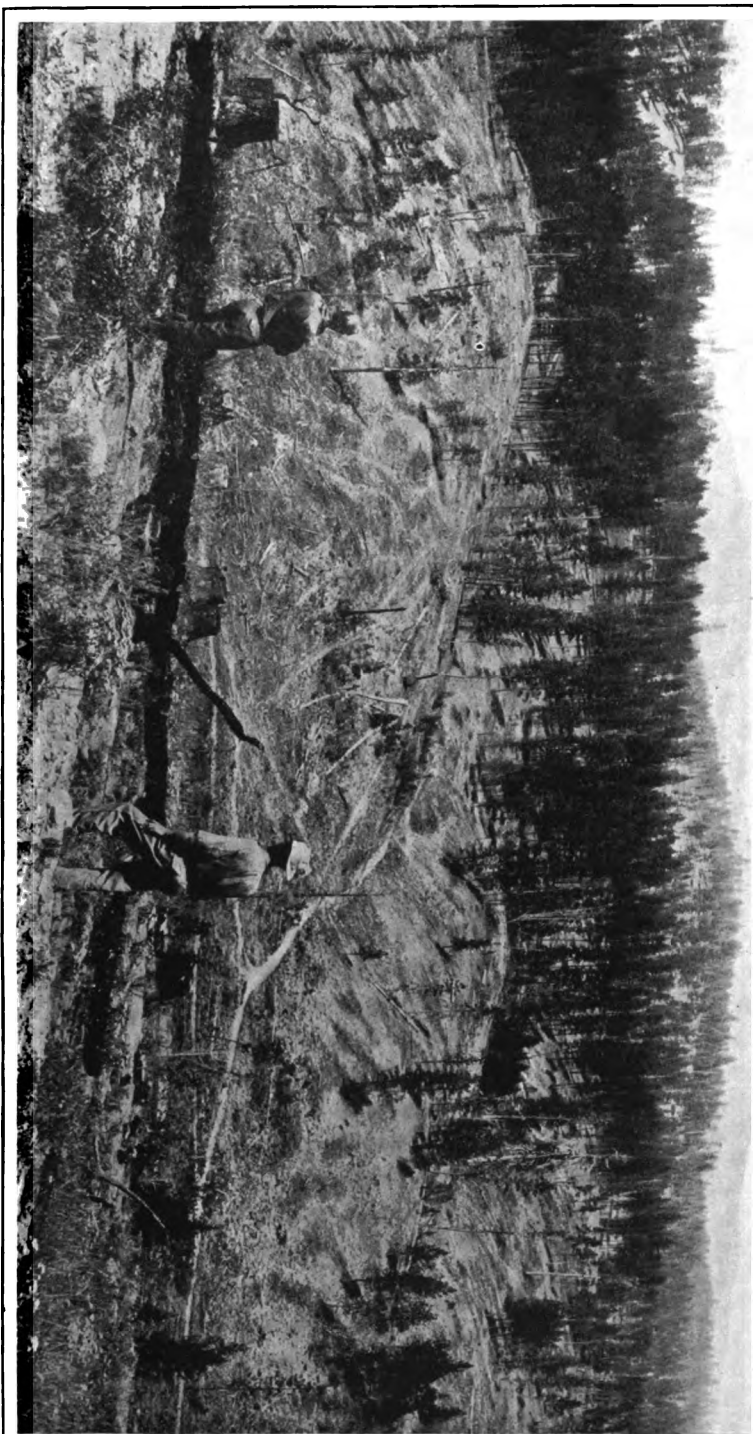


PLATE V

Unrestricted logging, Bitterroot National Forest, Mont., showing the difference between forestry logging and the old method of logging. Where the trees still stand is forestry

what can be got out of the forest for the present. The forester provides also for the future income. One of the first principles of forestry is that in order that the forest may continue to yield from year to year, no more wood should be cut during a given period than will be produced by growth on the tract in a like period (Plate V). As one means of carrying this into practice, the forester seeks to protect young trees from harm in connection with lumbering operations. Another way in which this principle is put into practice is by providing for the renewal of the forest by leaving seed trees. This is a method applicable particularly to coniferous forests, for the seeds of conifers are generally light and readily disseminated by the wind. In order that he may be able properly to direct the management of the forest when making cuttings, the forester studies the habits and qualities of the various species closely, with reference to their requirements for light, heat, soil, and moisture. This knowledge enables him to give preference to those species best suited to the region and local conditions. One of the particular abhorrences of the forester is waste in the utilization of wood in logging. It is a common practice among lumber operators to take out only that part of the trunk that is available for saw timber. Thus, much wood in the tops and branches is wasted by being abandoned in the woods.

Forestry, as applied to lumbering, seeks to encourage close utilization of all parts of the tree fit for use; also the lopping and burning of the brush to prevent its becoming a source of danger as fuel for forest fires. The Forest Service regulations require top, stump and brush piling and burning under suitable conditions, as a preventive to the spreading of forest fires. Another principle of forestry is that the forest should occupy only non-agricultural land. Good farming land is more profitable when devoted to annual crops than when planted to trees. On the other hand, there are some types of land, such as steep slopes, poor soils, and waste lands, that cannot be profitably utilized for agricultural purposes. It is on lands such as these that the forests should be maintained. Rough mountain lands are particularly adapted to forest purposes, because they cannot be profitably cultivated; and, furthermore, mountain regions are generally the source of numerous streams. It is essential that the flow of these streams be regulated, and the forest cover on the mountain slopes has this effect. Let the forest cover be removed from the hillsides, and the rain which formerly was

caught and soaked up by the litter and obstructions of the forest floor sweeps downward in rushing torrents, tearing gullies in the loose earth, filling the stream with silt and flooding the lowlands. In many parts of the Southern Appalachian Mountains erosion is especially destructive after the removal of the forests (Plate VI).

The real beginning of forestry work dates as far back as 1876 and appropriations have increased gradually until they now amount to over \$6,000,000 per annum. As previously stated it is the policy of the Service to make it pay so far as possible. The total receipts from National Forests on account of timber sales, grazing fees and special uses during 1915, were nearly two and one-half million dollars, or almost one-half the total Federal appropriation.

The work of the Forest Service is administered by the Forester and is organized in five different branches: First, the Branch of Operation which has general supervision of the personnel, equipment, fire protection, and permanent improvements. Second, Branch of Lands which examines and classifies the lands within the National Forests, including passing upon hydro-electric power privileges. Third, Branch of Silviculture which supervises the sale and cutting of timber. Fourth, Branch of Research which carries on all scientific investigations. Fifth, Branch of Grazing which supervises the allotment of grazing privileges and the improvement of areas depleted by grazing. It also co-operates in the enforcement of stock quarantine regulations. A separate unit of the Service is charged with the purchase of the Southern Appalachian and White Mountain Forest Reserve lands.

The country is divided into seven field districts in charge of a district forester. Each National Forest is in charge of a forest supervisor, who is under the general direction of the district forester. Supervisors must be men of experience in woods work, road and trail building, stock business, and all other lines of work carried on in National Forests. Under the direction of the supervisor are several forest assistants, or forest examiners, who examine and map forest areas, designate timber to be cut, survey boundaries, conduct forest planting, etc. Each National Forest is divided into ranger districts with a district ranger in charge of each. Rangers perform the routine work involved in the supervision of the National Forests. Logging engineers, lumbermen, scalers, planting assistants, and

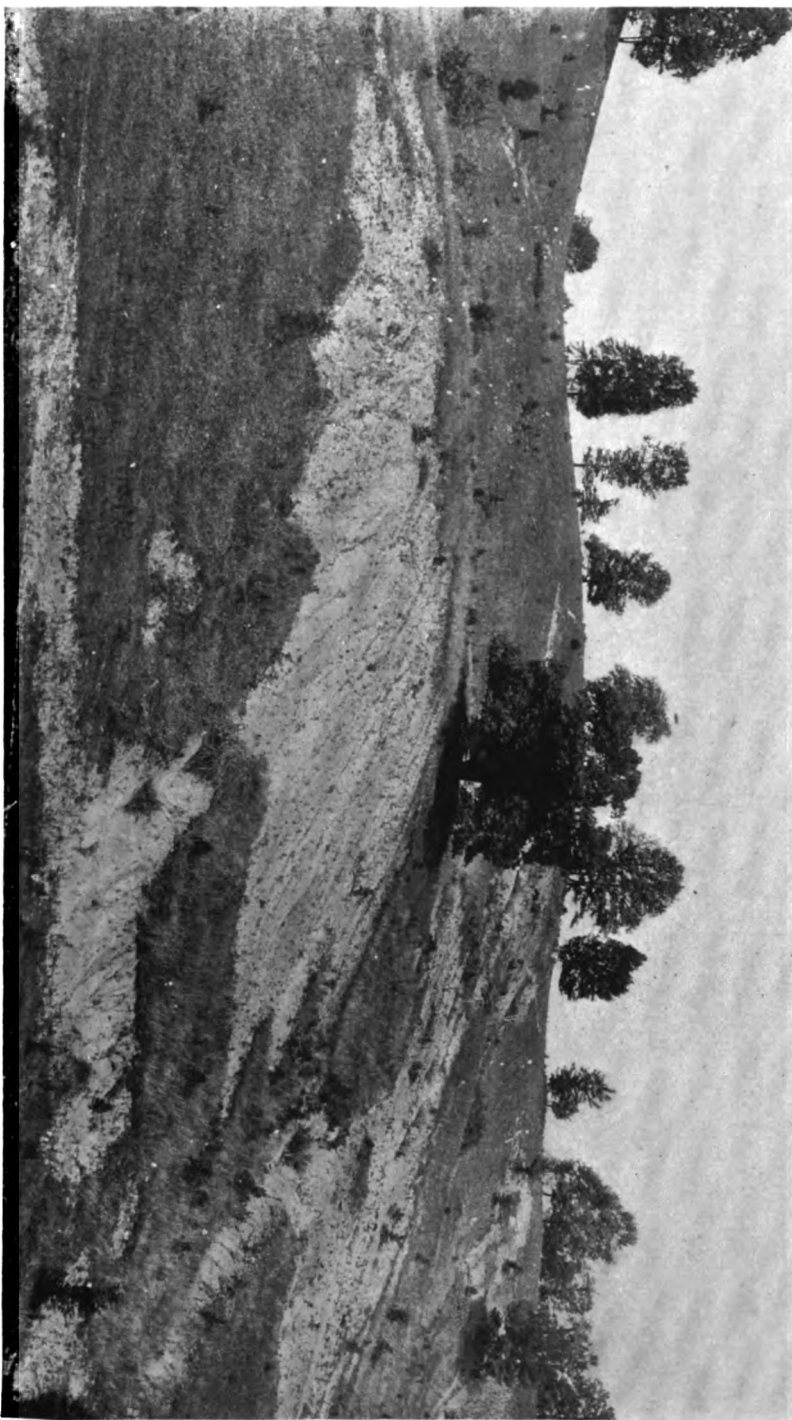


PLATE VI
Erosion of unwisely cleared slope, western North Carolina

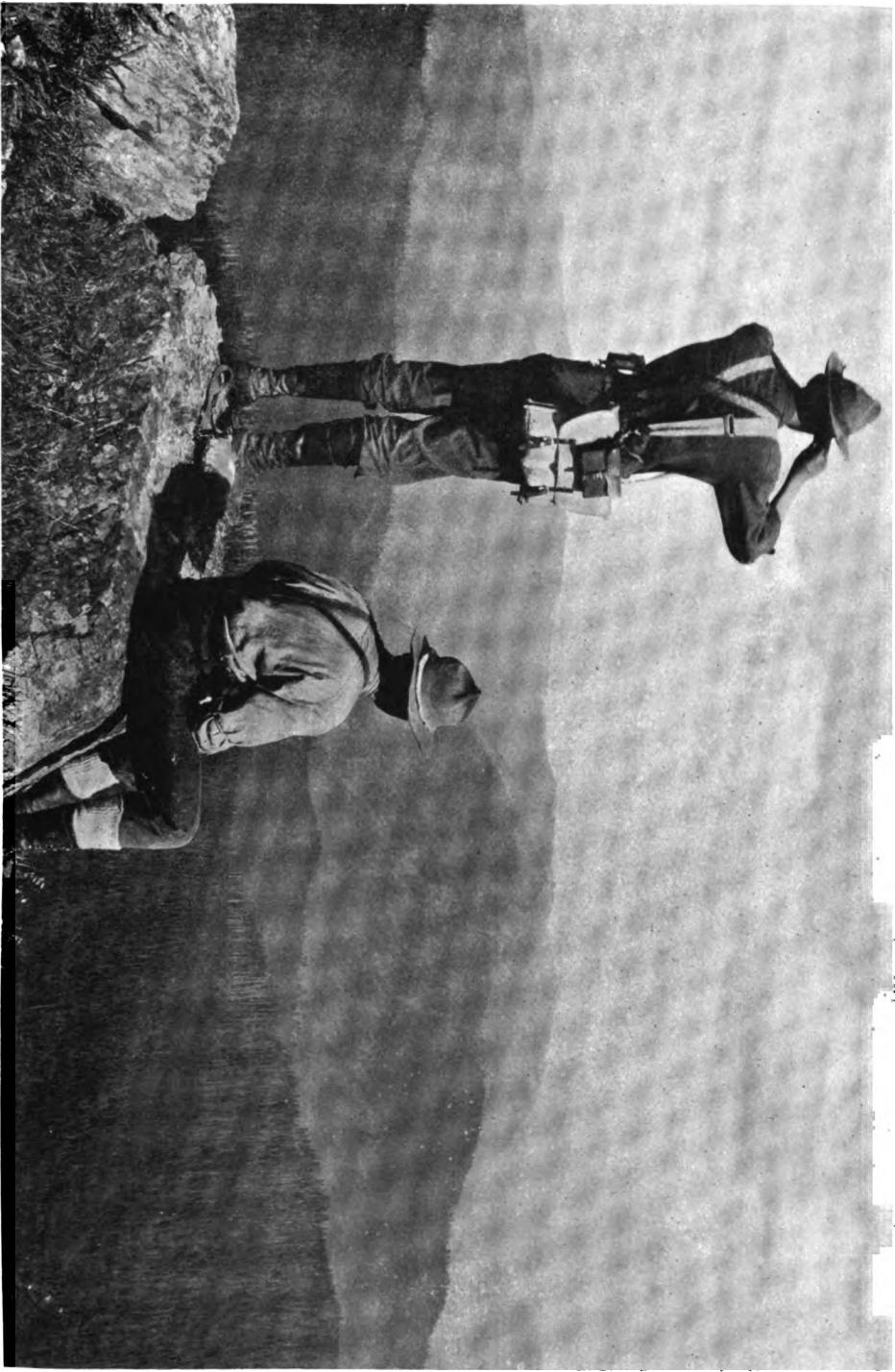


PLATE VII
Ranger and Forest Guard on Kilauea Point, Mt. St. Helens National Forest, Mont.

forest guards are employed for their respective lines of work. The total force employed by the Forest Service numbers about 4,000.

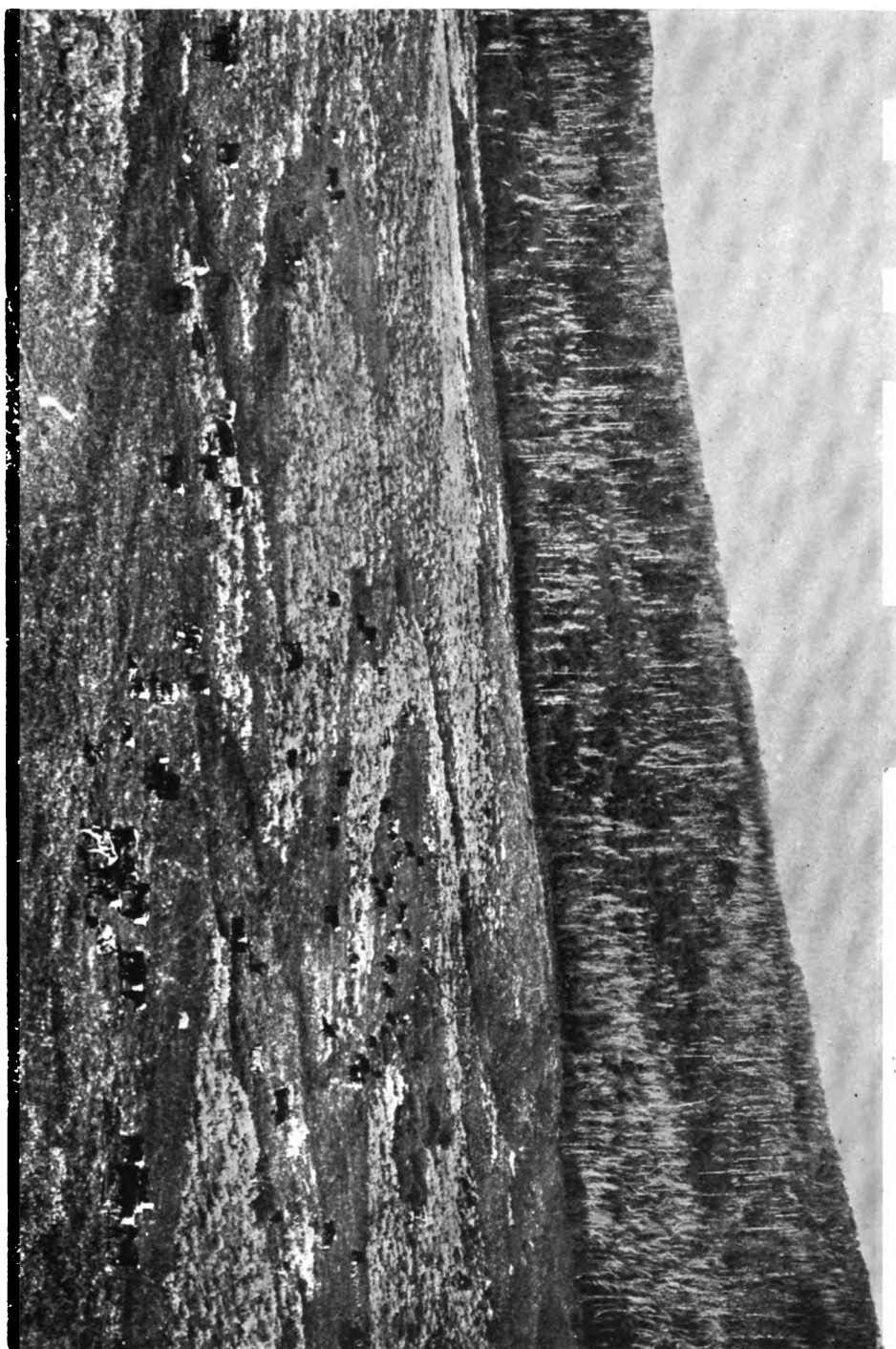
Thus far, most of the forestry practice in the United States has been confined to the National Forests and is under the direction of the Forest Service. The first concern of the National Government in this work is for the protection of the existing timber. Hence, there are employed to patrol the National Forests a force of about 1,800 Rangers. The greatest enemy with whom the Ranger has to contend is the forest fire. This insatiable monster, it has been estimated, consumes more than twenty-five million dollars' worth of timber every year, frequently demanding the sacrifice of human life as well. A great fire in Michigan in 1881 swept over more than a million acres of land and caused the loss of 138 human lives. Recent fires in the Northwest have been almost as destructive. The watershed of North Fork of St. Joe River in Coeur d'Alene National Forest in Idaho was largely cleaned out by forest fires which swept over vast areas in the Northwestern States in 1910 (see Plate II). Fire breaks are constructed where feasible to stop the onrushing flames. The Forest Rangers are called upon to exercise the utmost vigilance in watching for signs of fire in order that they may be extinguished before they grow beyond control. Lookout points are located at high elevations through the Forests, from which Rangers watch for signs of fire all through the danger season (Plate VII). One of the greatest aids to the Rangers in fighting fires is the telephone. Many telephone lines are now established on the National Forests, and by means of these the Ranger is able quickly to report a fire and summon aid. It has hitherto been difficult to travel over the National Forests and to get at fires quickly because of the roughness of the country. This is being remedied by the Forest Service as fast as possible by the laying out and construction of systems of trails and roads, which frequently serve the double purpose of ways of travel and fire lines beyond which fires may not readily pass. Bridges are also being erected by the Service. These bridges, roads and trails are opening up a hitherto inaccessible wilderness to the settler, the miner, the lumberman, and the traveler and recreation seeker. ¶

One of the problems with which the Forest Service has to deal on the National Forests is that of the regulation of grazing, particularly by sheep on range lands. On the Forests

there are many tracts not suited to agriculture, yet which may be utilized for grazing purposes (Plate VIII). Formerly, when grazing was unrestricted, much harm was done to these ranges by over-grazing. Now, however, stock owners secure grazing privileges by a system of permits and by this method the range and the forests are protected. Over 7,000,000 sheep and goats and nearly 2,000,000 cattle and horses graze within the confines of the National Forests. Sheep do more damage than cattle, if allowed to graze unrestricted. Furthermore, cattle will not graze on lands over which sheep have been grazed. Consequently, on the National Forests, separate areas are allotted to the sheepmen and cattlemen (Plate IX). Experiments have also been quite successful in protecting sheep from marauding animals by keeping them without herders in areas fenced wolf-tight. It is the endeavor of the Forest Service to assist as far as possible in protecting the sheep and cattle on the National Forests from beasts of prey, but at the same time to protect the harmless game animals. Under State laws, the Rangers are often appointed as game wardens to this end. Many coyotes, wildcats, and wolves are killed every year by the Rangers and by hunters specially employed by the Government for this work.

Although it was not the purpose of the Government in establishing the National Forests to include farm land, nevertheless some land suited to agriculture, along river bottoms and on plateaus, has unavoidably been included. Where such land is found, it is opened to settlement. The Forest Service is now engaged in a wholesale examination and reclassification of National Forest land to find any remaining tracts suited to farming. There are numerous opportunities for the development of water power and irrigation projects on the National Forests. The Government aims to encourage the development of these projects by private capital but to prevent their monopolization. This use of National Forest land is therefore regulated by permits.

An important work of the Forest Service on the National Forests is, of course, the handling of timber. It is the aim of the Service to prevent needless destruction of the forest, yet at the same time to permit the timber to be cut as fast as can be done without permanent injury. The boundary between the private holdings of lumber companies and the National Forests is often clearly marked by the condition of the stand (see Plate





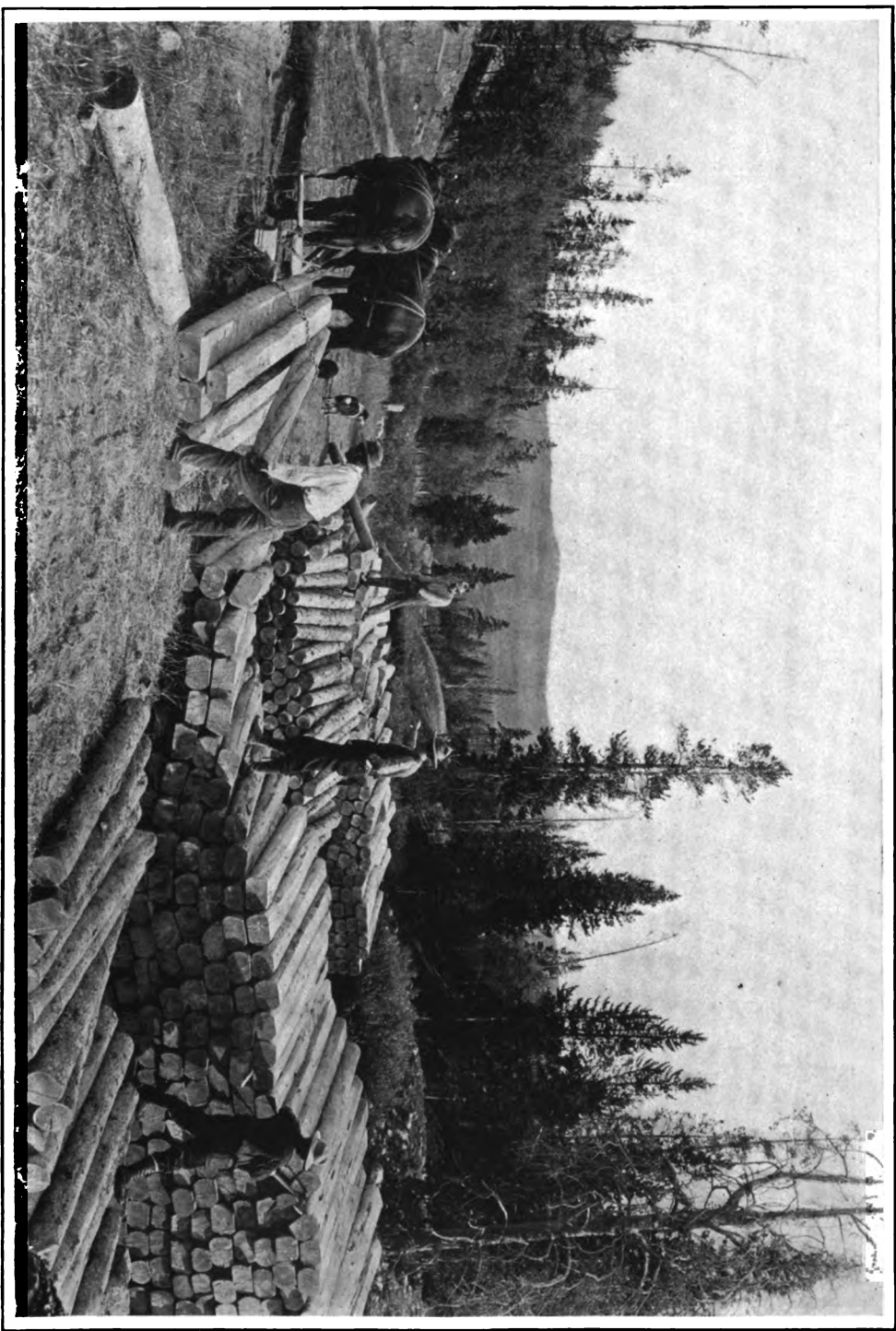


PLATE X

The cutting in lodgepole pine, near Evanson, Wyo. Piling finished ties along banks of streams, awaiting spring freshets to float them to shipping point. Also illustrating the use of the

V). When the forest is in condition for cutting over a considerable area, a timber sale is announced and the timber sold by contract to the highest bidder. Under these contracts, the trees to be cut are carefully marked by the Forest Service so as to safeguard the future welfare of the forest (Plate X). Timber is sold to local residents for domestic use at the cost of marking. Dead and down timber is given to them free of all cost. As far as possible, in a timber sale, those trees are selected for cutting that are mature—i. e., that have reached a state where the rate of growth has begun to slow up. Another type of tree to be removed is that which has begun to show signs of the attack of insects or fungi. It is aimed to leave a thrifty stand of young, vigorous trees to replace those taken out. The same care is taken in cleaning up the debris after lumbering as in selecting the trees for cutting. Usually the brush is carefully piled and is burned when there is no danger of the fires spreading from the burning pile to the surrounding forest, as when there is a snow on the ground.

Tree planting on the National Forests has been thus far largely experimental. We have not yet reached the stage where commercial tree planting on a large scale is either necessary or profitable. Yet a great deal is now being done in the way of artificial reforestation, both by seed sowing and planting of young trees. Tree seed is gathered by the Rangers each season. A small part of the tree seed collected is used for direct sowing on burned-over or otherwise depleted forest lands; but the Service also has established about thirty nurseries for experimental tree growing and the production of young trees for planting. These nurseries have a capacity of over thirty-five million trees per year. The seedlings and transplants from these nurseries, when large enough, are set out on lands which are particularly in need of reforestation, such as the slopes of watersheds, and denuded by old fires. About fifteen thousand acres are reforested yearly. In the work of tree planting, particular attention has been given to experimental planting on the sandy regions of western Nebraska. A large nursery station is maintained at Halsey, Neb., and from this nursery, under the Kinkaid Act, is made the free distribution of trees to settlers for planting on homesteads. Experiments are also being carried on by the Forest Service in the introduction of new species of trees from other countries and from one region to another. Thus, plantations of maritime pine have been es-

established on the sands along the Columbia River in Oregon and several species of eucalyptus, a tree very popular with California planters, have been introduced into Florida.

Aside from the work on the National Forests, the Forest Service is engaged in numerous investigations and experiments designed to aid wood users generally. One of the improvements in milling equipment which has been urged upon mill operators is the replacing, wherever possible, of the old-fashioned circular saw by the narrow gauge band saw, because of the smaller loss in sawdust due to the narrower kerf made by the saw blade. Experiments have been conducted in improved methods of paper manufacture, and the utilization of new and cheaper species of wood for this purpose. Among other results, the suitability of jack pine for pulp has been demonstrated and an excellent grade of pulp has been made from western yellow pine mill waste. In the "naval stores" industry, the practice of collecting the crude resin from the trees by the use of a cup (Plate XI), attached to the tree has been introduced largely through the efforts of the Forest Service. The old method of "boxing" (Plate XII) the trees, injured them severely and weakened them so that they were easily blown down by winds. Much progress has been made in the experiments toward improved methods in wood distillation. Attempts are now being made to find methods of utilizing mill waste for this purpose on a paying and practical basis. Important results have also been obtained in improved methods of refining and grading the crude products of distillation. Many laboratory tests have been made to determine the comparative strengths of various kinds of woods, such as those used in construction and vehicle manufacture. Studies have also been made as to the other physical properties of woods. The Forest Service has been constantly engaged in studying methods of seasoning and preservative treatment of timbers. Wood preservation is rapidly being put into practice by many wood users, such as the railroads and users of poles and posts, and as a result, not only are many cheaper varieties of wood made available, but the life of timbers in use is greatly extended.

While most of the work of co-operation with private owners of woodlots is now carried on by the State forest organizations, the Forest Service encourages the application of scientific forestry on private holdings as much as possible and aids by giving advice or suggesting methods of handling woodlands.



PLATE XI
Working Cup System in Second Growth Timber, near Ocilla, Ga.

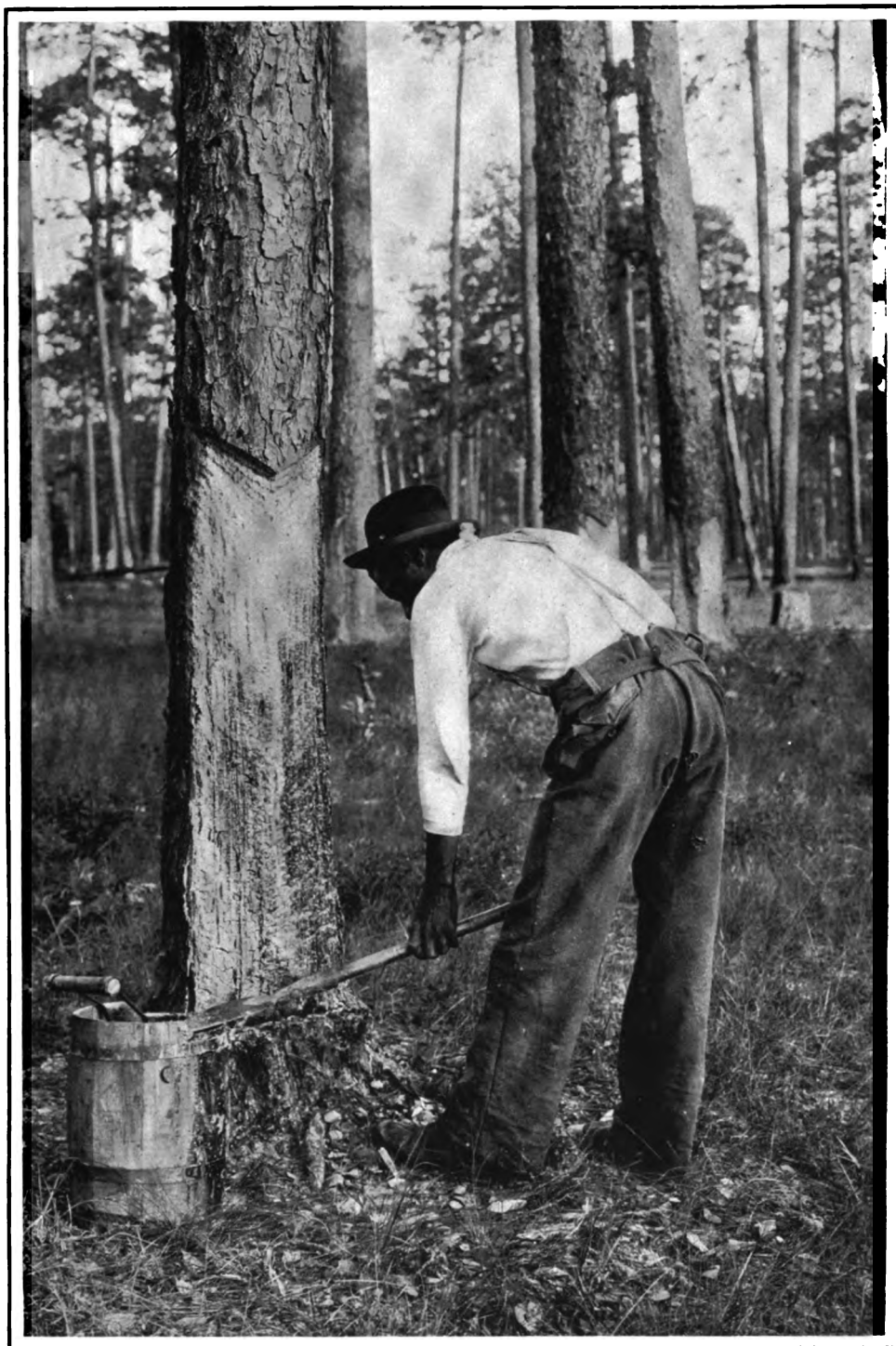


PLATE XII
Dipping from the box. Near Ocilla, Ga.

The most important recent development in the forestry movement in the United States was that provided for by the Act of Congress of March 1, 1911, commonly known as the Weeks Law, which provided for the acquisition by the National Government of forest lands on the watersheds of the Appalachian and White Mountain regions. Under this Act, land is being acquired as fast as examinations can be made and the approved tracts purchased.

ELECTRICITY IN MODERN PRINTING

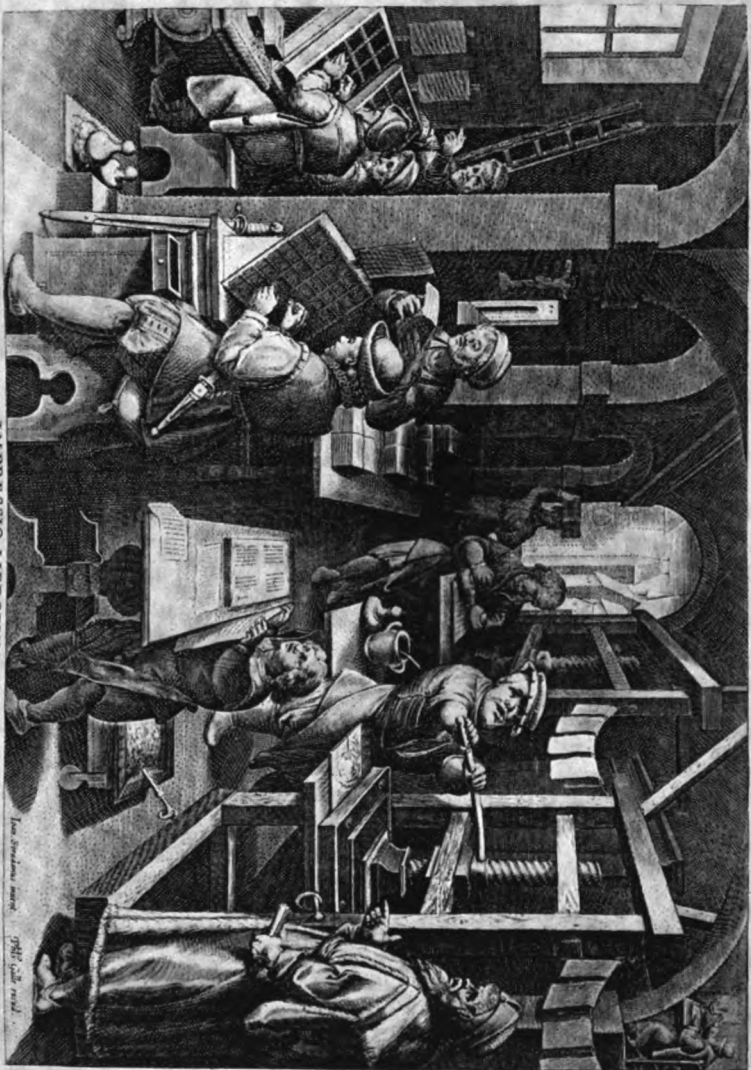
In his diary of 1666 Samuel Pepys wrote: "Away to the Temple to my new booksellers and there I did agree for Rycaut's late 'History of the Turkish Policy' which cost me 55s.; whereas it was sold plain before the late fire for 8s. and bound and colored as this is for 20s.; for I have bought it finely bound and truly colored, all the figures, of which there was but six books done."

So even in Mr. Pepys' time, 250 years ago, there were limited editions and high costs of printing for books "finely bound and truly colored."

Pepys' bewails a 40 per cent increase in the cost of his history and, strange as it may seem, he does not blame the printer. All that is needed to make his chronicle fit today is an entry on the advancing prices of paper, inks, composition, press-work, and binding.

If he had visited the London print shop of his time he would have found some of the old wooden hand presses, but slightly improved since their invention by Gutenberg, about 1450. They consisted of heavy wooden frames, with massive cross beams extending to the ceiling to keep the head from forcing itself up when pressure was applied. Power was obtained from a simple wooden worm screw turned by a lever which forced down upon the type page a horizontal plane, called a "platen." The type was inked with balls of wool covered with leather, the paper placed in position, the bed pushed back in the platen and the impression pulled. The "run" of a press was about fifty sheets an hour and only half the capacity of the bed could be used in making one impression. Metal cast type was used and a few type foundries were established, although here the government must have favored a combination in restraint of trade, for in 1637 a decree was enforced in England limiting the number of type founders to four. Print shops were scarce; daily newspapers were to be unknown for forty years, and mercantile establishments were obliged to worry along without magazine advertising appropriations or four-colored catalogs and "follow-ups."

The present position of the printing business as one of the leading industries in the United States is due, in large part, to the comparatively recent growth of periodical literature,



IMPRESSIO LIBRORVM.
Potest ut una vox capi aut plurima: Lemunt ita una scripta mille paginas.

SAID TO BE THE FIRST PICTURE EVER MADE OF A PRINT SHOP

coupled with stupendous increases in magazine and "direct by mail" advertising. This, in turn, has been made possible by the development of many remarkable machines used by printers. One of the greatest achievements of American inventive genius is the modern cylinder press, huge in size, capable of great speed, and as carefully and accurately constructed as a watch. While the old time hand presses were printing 50 small sheets an hour, the big cylinder presses of a modern printing establishment can turn out 1200 to 1500 sheets as large as 44x64 inches; three of these sheets will more than equal a complete Stone & Webster Journal. Into the still larger and more complicated presses specially built for the production of the very large editions of magazines and periodicals, such as the *Ladies' Home Journal* and *Saturday Evening Post*, rolls of paper are automatically fed which emerge printed in four colors, folded and bound ready for mailing.

While history does not record it, Gutenberg, the inventor of printing from movable types, may possibly have dreamed that some day type would be set by the aid of a machine. For centuries the invention of such a machine was the dream of inventors. Hundreds of patents have been issued in the United States, as well as in Europe, for type composing machines. Perhaps the most famous of these was the Paige, a wonderful mechanism that called forth the admiration of scientists—and cost Mark Twain his fortune. It was so intricate, so costly to build, and its operation was so complicated, that it was foreordained to failure, notwithstanding that from a mechanical point of view it was a complete success.

After years of experimenting with various kinds of composing machines, entailing the loss of large sums of money by the investors, the Linotype machine was evolved, being adapted especially to newspaper composition. This was followed a few years after by the Monotype. These two machines have now practically superseded all of the others. Hand composition has been almost entirely done away with on book and magazine type setting, although of course it is still necessary to employ it for advertising pages or special display in large size types.

With the Linotype the operator plays on a keyboard very much as a stenographer does on a typewriter. As the keys are touched, matrices are released, fall in line between two steel jaws, and are carried to a mould where hot metal is pressed into

them forming the letters. The matrices are then automatically lifted back to the magazine and distributed.

Like the large printing presses just mentioned, the Linotype is a comparatively modern invention, first appearing in a very crude form about 1886. As stated, it was designed for use in newspaper offices and has there found its greatest field of usefulness; practically all daily newspapers in the United States, as well as in many foreign countries, are composed on Linotypes.

The product of the Linotype is a slug or bar of metal, on the upper edge of which appears in relief the letters making up a line of reading matter or type, hence the name, "Linotype." With the narrow columns and comparatively small letters used by newspapers, and the resultant small slugs or bars of metal required, the Linotype can be operated at great speed, expert operators doing as much work as ten or twelve hand compositors.

For larger type, greater length of lines, and letters more carefully cast from harder metal, as is demanded by publishers of the better class of magazines and books, an entirely different style of composing machine has been developed—the Monotype. Instead of a solid bar of metal carrying the letters to be printed from, the Monotype product is individual type, properly assembled by the machine. The Monotype consists of two separate machines, one the keyboard (shown on plate I) and the other the caster (shown on plate II). The keyboard has the same arrangement of keys as a typewriter, except that a shift key is not used. Instead of a single alphabet of keys, like a shift-key typewriter, the Monotype keyboard is usually equipped with six alphabets of keys so the operator can compose in any line Roman, Italic, and bold face large and small letters, as well as special characters, such as accents, etc.

When the operator presses a key small holes are perforated in a roll of paper, much like that used in an automatic piano player. When approaching the end of a line, as with a typewriter, a bell rings. The operator then presses a special key, which revolves an ingenious counting mechanism that indicates how wide must be the spaces between the words to make the line the width of all the other lines. The proper space keys are then struck, the perforations of which differ from those made by the letter keys. After the ribbon of paper is perforated, it is automatically fed through the casting machine. The *last*



PLATE I

Monotype keyboards. The machine at the left is a "DD" or double keyboard equipped with two paper ribbons

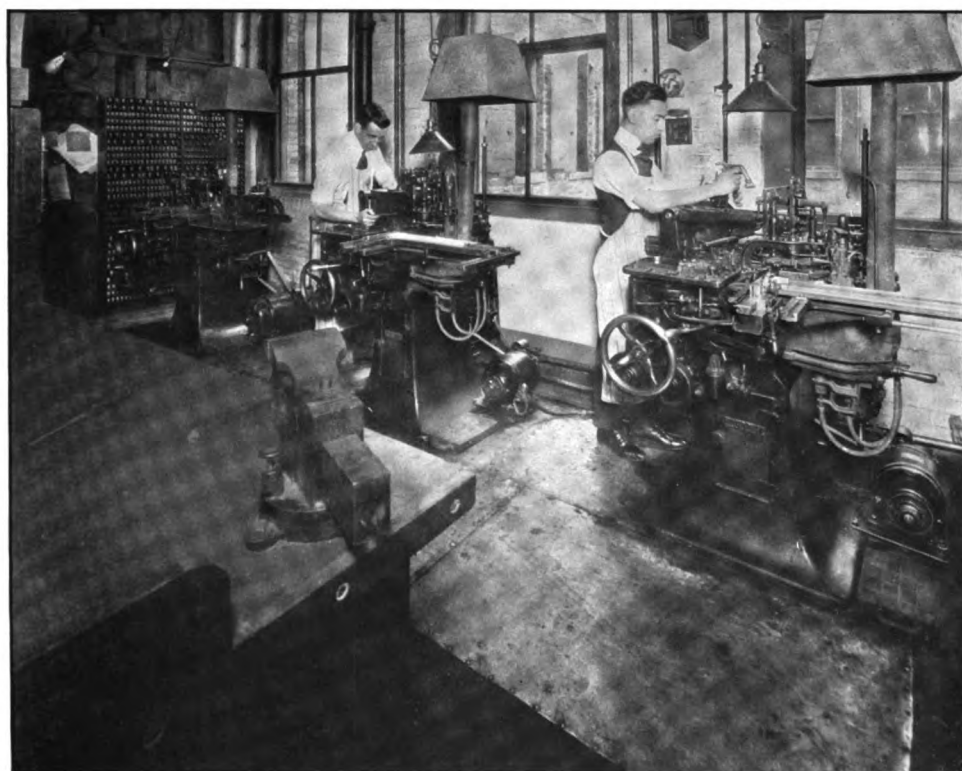


PLATE II

Monotype casting machines. These are operated by electric motors, but the mechanism is controlled by compressed air



PLATE X

An art department is part of the equipment of a modern printing office. Even here electricity has a small but important part, compressed air from the air compressor being used to operate the designer's air brush, a great time-saving device.



PLATE XI

Hand composition room. Here electric power is a small factor, the work being performed in much the same manner as in Gutenberg's day

perforations the keyboard operator made, those that determine the width of the spaces between the words in the line, are the *first* presented to the casting machine. These adjust the machine to produce spaces of the proper width, after which the letters are cast in the required order.

The foregoing description applies only to the ordinary Monotype keyboard, known as the single or "D" board. In many printing offices this has been superseded by a double keyboard, called the style "DD." This is identical with the single board, except that it is equipped with two paper ribbons, as well as the mechanisms that operate them. Striking any key on the keyboard causes perforations to be made in both ribbons of paper, or by the movement of a small switch either ribbon can be disconnected from the keys so that the perforations are made only in one of the ribbons.

The "DD" keyboard has increased greatly the usefulness of the Monotype. Assume that the copy to be put in type is a novel that is first to be printed in small type, two columns to the page, for use in a magazine like *Harper's* or *Scribner's*. Afterward the novel is to appear in book form, one column to the page, and in larger type.

The operator moves the switch so both paper ribbons are in operation, and proceeds to compose or "keyboard" the copy. Every key the operator strikes makes perforations in both ribbons. One of the ribbons, when fed through the casting machine, produces small type set in a narrow measure. The product of the other ribbon is the same copy set in large type and of a wider measure. Thus, it will be noted, one operation at the keyboard produces at the casting machine two entirely different products.

Assume that the copy consists of alternate paragraphs of large and small type, such as a dictionary, or that these alternate paragraphs are to be set in Roman and German type. The operator moves the switch to the right, locking out the right paper ribbon, and sets up the first paragraph. The switch is then moved to the left, bringing the right hand ribbon into commission and locking out the other, and the next paragraph is composed. The two different ribbons are then fed through the casting machine and the product assembled in proper order.

The operation of the Monotype casting machine (shown on plate II) is entirely automatic, after having been adjusted and started, requiring no further attention except that the

melting pot be kept supplied with metal, the latter being a mixture of tin, antimony, and lead. While at first sight it would seem to complicate matters to use two machines on the Monotype instead of one as in the case of the Linotype, there is really an advantage in this arrangement inasmuch as the keyboards are much less expensive than the casting machines, and the casting machines being entirely automatic enables one man to operate several of them; it also enables the keyboard operators to do their work during the day, while the casting, being a mechanical proposition, can be done at night without detriment to the quality of the work.

As usually equipped, the Monotype produces composed type of any of the various sizes used for the text of books and magazines. By means of larger molds the casting machine can also be used to cast type as large as 36 point, that is, letters one-half inch high. After being cast, these larger letters are stored in shallow wooden trays called "cases" and used for hand composition.

The Monotype produces type so rapidly and cheaply, the small sizes being turned out at the rate of about 150 a minute, that it is more economical to use the type only once, melting it up as soon as used. In this manner all work is printed from new type, and there is no excuse for blurred letters such as is caused by the over use of foundry type.

With the Monotype keyboard, to attempt to force the punches through the paper ribbon by pressure on the keys would require too much effort, exhausting the operator and reducing her speed. Instead, compressed air is used, a slight touch of a key releasing the pressure and instantly forcing the punch through the paper. This air is supplied by a compressor, driven by a constant-speed electric motor (shown on plate III).

Compressed air, taken from the same compressor, also controls the mechanism of the Monotype casting machine. In addition, each casting machine requires a three-eighth horse-power electric motor to operate the mechanism, the latter consisting of a bewildering array of cam levers and bell cranks.

From the Monotype type or Linotype slugs, after they are removed from the machines, proofs are taken, which are carefully compared with the copy and all errors corrected. When the final proofs are approved by the author or editor, the type or slugs are made up into pages, and these are locked into steel frames called chases. In the case of the Stone & Webster

PLATE III
This air compressor operates the Monotype keyboard, and controls the mechanism of the Monotype casters. It also operates the air brushes for artist's use

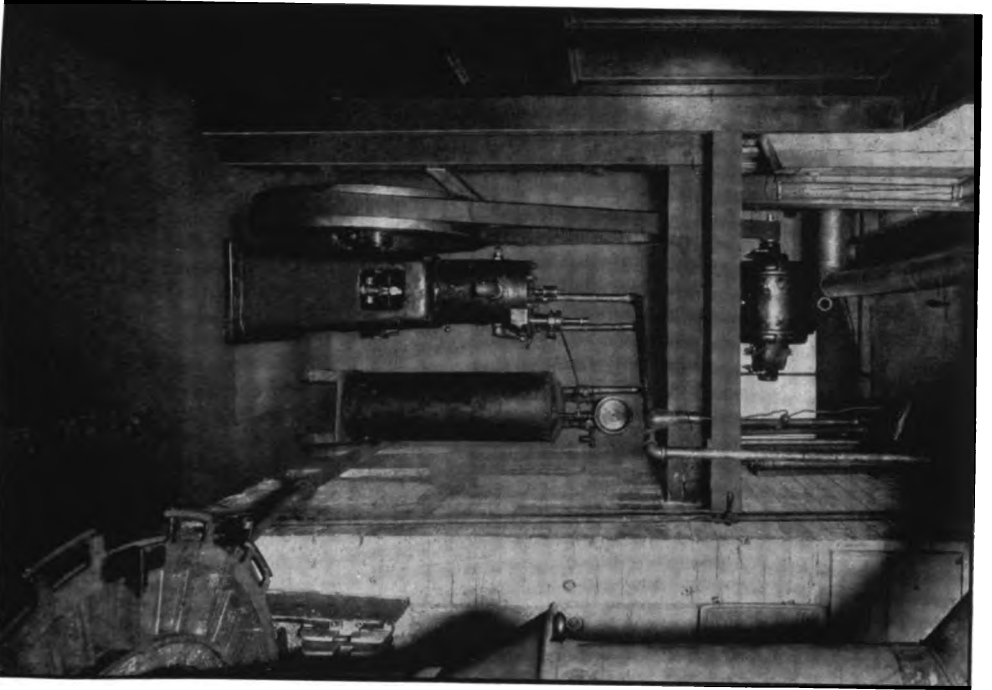
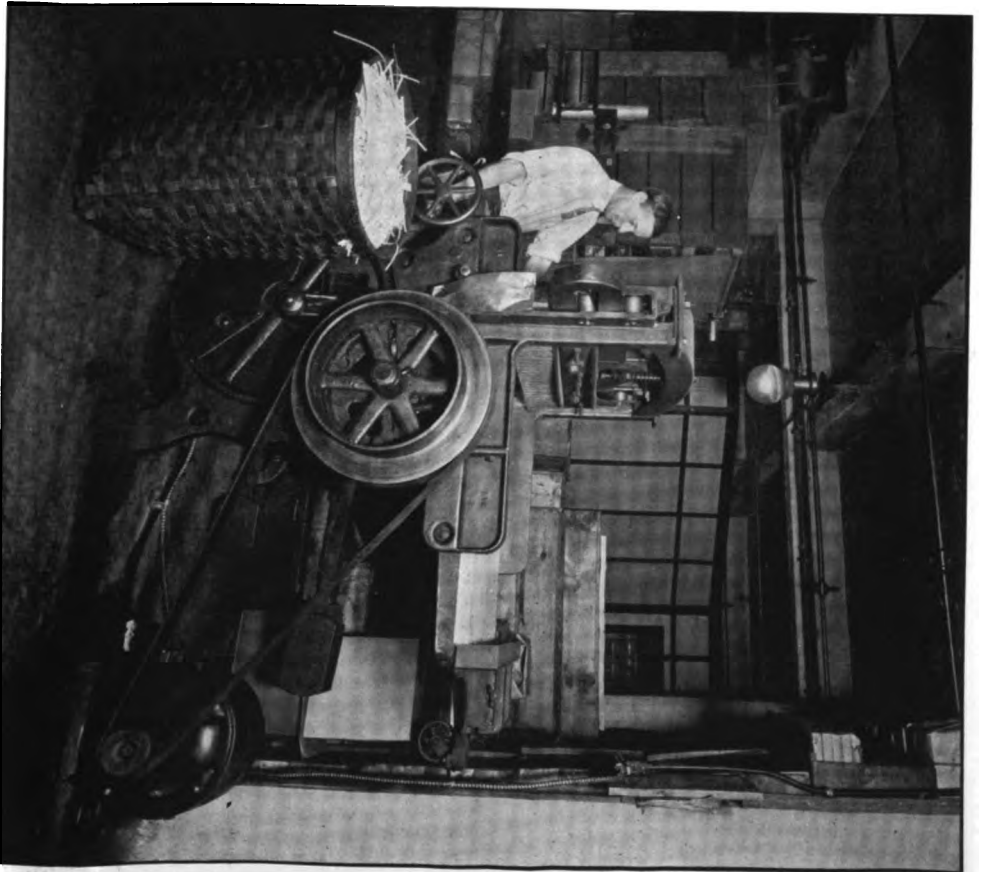


PLATE IV
An electric-driven paper cutter



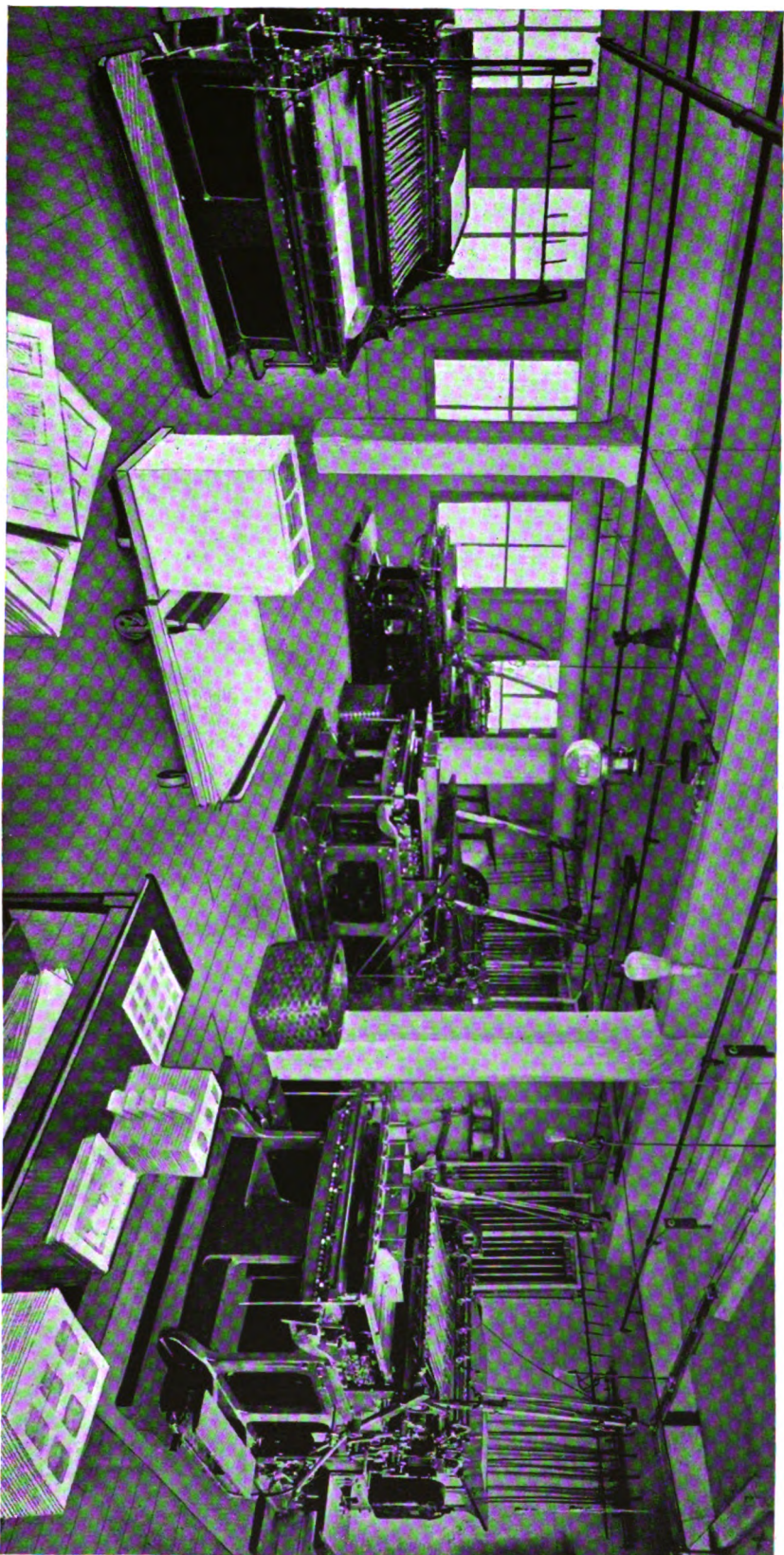


PLATE V
A portion of the press room—Note the absence of shafting and dirt-producing belts

Journal, 16 pages are fastened or locked up in a single frame or chase. This "form," as it is now called, is placed on the bed of a cylinder press, and the press adjusted or "made ready" so that every page receives exactly the right amount of pressure as well as ink.

With certain classes of work making ready is a very slow process requiring the painstaking attention of skilled workmen. The Stone & Webster Journal is a good example of the two kinds of make ready used in most printing offices. With the text pages the process is very simple. The type being brand new and all of uniform height, broadly speaking, all that it is necessary to do is to build up the large cylinder which passes over the type form with sufficient thicknesses of paper to give exactly the right pressure, adjust the flow of ink to the ink rollers, which also pass back and forth across the form, and proceed with the printing.

The forms containing the illustrations require an entirely different treatment. The half-tones, as the plates from which the illustrations are printed are termed, are thin sheets of copper on which the pictures have been etched by a photo-mechanical process. They are tacked to blocks of wood about $\frac{1}{16}$ of an inch thick, to make the plates of a height uniform with that of type. No matter how carefully this wood is seasoned, a change in the moisture in the air causes the block to increase or decrease in size. This may be no more than a thousandth of an inch, but so accurately are modern cylinder presses built that this error must be corrected if the best results are to be obtained. The usual practice is to mount the plates on blocks of wood a trifle less than the standard in thickness. The first operation of the pressman is to paste to the bottom of the wood blocks thin sheets of paper until the blocks are all of uniform height. This ensures that in passing over the form the rollers will discharge to every plate, and on every part of the same, an equal amount of ink.

The foregoing process is called "underlaying"; the next is termed "overlying," and is necessary when printing half-tones. The pressman first prints an impression of the half-tone on a sheet of paper, and then on this sheet pastes very thin pieces of paper on all parts of the plate which are intended to appear dark. The very dark parts may carry several sheets of tissue paper; the medium tones only one or two; while none are pasted to the light parts, such as the sky in a landscape illustra-

tion. The "overlay," as the pasted sheet is now called, is attached to the cylinder of the press so that when printing it will register exactly on the plate, exerting unequal pressure on its surface and bringing out sharp and clear all the details.

Cylinder presses are operated by electric motors of two to five horse power each and are provided with variable speed controllers giving as many as twenty-one forward speeds and three reverse, thus enabling the pressman to operate his press at any speed desired.

While electricity is an invaluable assistant to the printer, under certain conditions it becomes a foe that causes him endless trouble. When the atmospheric and other conditions are favorable, the friction caused by the swift passage of a sheet of paper through the printing press cylinders generates a considerable amount of static electricity. This collects on both sides of the sheet, the positive electricity on one side and the negative on the other, and as positive attracts negative, the sheets stick together to such an extent as to offset the print from one sheet onto the next, and unless it can be equalized or eliminated in some way it is almost impossible to do high-grade work. On cold, dry days it is not unusual for sheets to stick together as if coated with glue. The old-time printers did not encounter this trouble, because they worked very slowly, and also dampened their paper before printing: present-day conditions make this impossible, therefore a method had to be devised to equalize the electricity as the sheets pass through the press. This has been accomplished by a simple device known as a "neutralizer," shown on plate VI.

From a regular A. C. power circuit, wires lead to a "step-up" coil which raises the voltage from 220 on the primary circuit to about 12,000 volts on the secondary. One end of the secondary circuit is grounded on or connected to the body of the press, the other is connected to an insulated distributing bar extending across the entire width of the press but very carefully insulated from it. The bar is so located that the paper in being delivered passes very close to it, either above or below as most convenient, depending on the design of the press. While the voltage of the current carried to the distributing bar is very high, the amperage is quite small, so that the volume of the current is not sufficient to injure an operator getting hold of it by mistake, except possibly to surprise him some. The distributing bar is provided with a number of small points, and

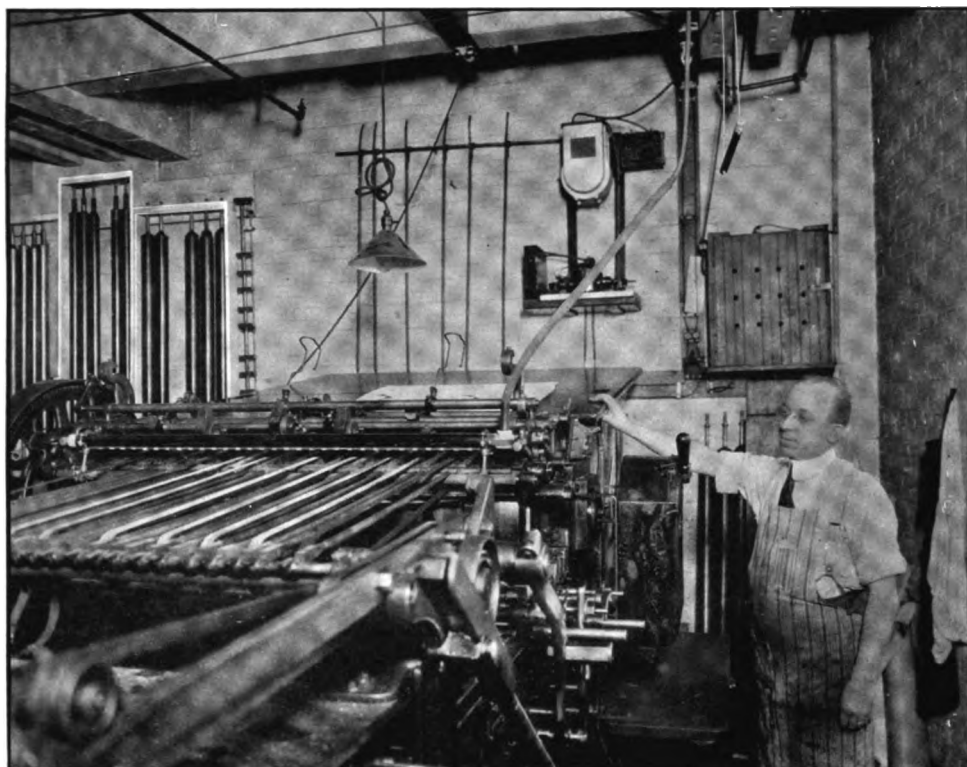


PLATE VI

Attached to the wall is shown the device for removing static electricity from paper. The flexible pipe leading from the ceiling to the top of the press contains the insulated wires that run from the "step-up" coil to the distributing bar; the latter is placed on the front of the press, the line of white dots being the distributing points. Directly in front of the pressman appears the variable-speed controller.

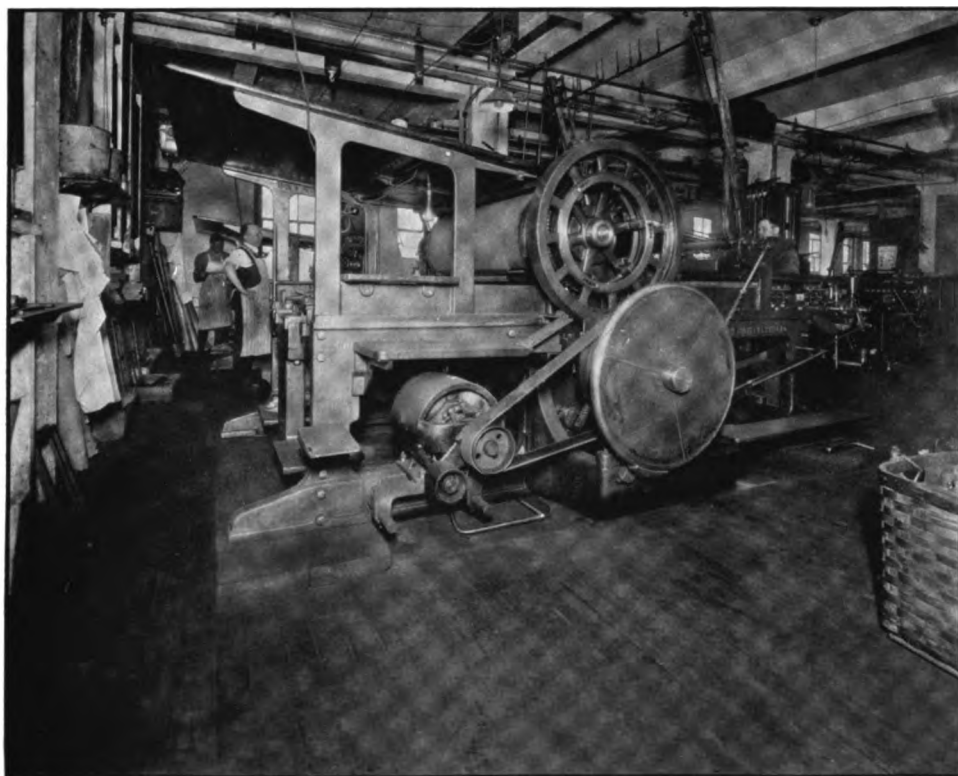


PLATE VII

As will be noted, the motor is mounted on the frame of the press, the power being transmitted by a short belt

as the sheets pass close to these points the current passes to the sheet from the points on one side and from the press on the other, and as the alternating current has no polarity it neutralizes or equally distributes the static electricity that has collected on the paper.

After the sheets are printed they must be folded. The machine used for this purpose is driven by an electric motor (see plate IX). Much inventive genius has been exercised in perfecting the modern folding machine, some recent machines being capable of handling an almost limitless range of work. All, however, are of the same general principle. The sheet is pushed against two gauges, which move away as the sheet is seized by a set of rollers that carry it into the machine. When the sheet is at a predetermined position, a long knife descends across the center of the sheet, forcing the sheet at this point between two rapidly revolving rolls. It is then carried to another knife where the operation is repeated. This is continued until the sheet is folded to the required number of pages. After folding, the sheets of a book are collated in the proper order and bound together by various means. In books they are sewed together in signatures generally of sixteen pages each. In magazines, by means of wire staples. With both types of machines electricity is the power used. Then the covers are put on and the final operation in the case of a magazine like the *Stone & Webster Journal* is the trimming of the books to uniform size. This is accomplished by the paper cutter, a powerful machine carrying between two uprights a long heavy knife, sharpened to a razor edge, which is forced through the pile of books, easily cutting a pile four to six inches high, as smoothly as you could cut a piece of cheese with a knife. This machine is operated by power from electric motor, as shown on plate IV.

It is difficult to overestimate the important part electricity has had in the development of the printing industry. In a plant like that pictured in this article¹ individual motor drive is used for every machine requiring power—air compressors, Monotype casters, presses, folding machines, wire stitchers, paper cutters, perforators, saws, etc. Each machine thereby becomes an independent unit, no longer dependent upon line shafting for its location. This makes it possible to arrange the equipment to the best advantage so that work can pass from one machine to another with the least handling and loss of time.

¹Pinkham Press, 236 Congress Street, Boston.

Better lighting and absolute cleanliness followed the introduction of electricity. Time was also saved and production increased, due chiefly to the wide range of speeds the individual motor drive makes possible. It is most important that a printing press be operated at any desired speed. As atmospheric conditions, the nature of the paper and ink, as well as character of the forms to be printed, are constantly changing it means that with every job the speed of the press must be increased or decreased to secure the best results.

Only those who have labored in printing offices before the advent of individual motor drive can fully appreciate what a great boon is electricity. Dirty, noisy, inefficient, expensive, the steam engine-main belt and shaft method of power transmission well deserved to be eliminated. Not the least of its evils was the total shut-downs due to belt and line shafting troubles. Another was the limited number of speeds available, the usual speed cones in use affording only three.

Except in very rare cases, it is not at all practical for the printer to install his own power plant. It is the exceptional printing office that requires as much as 100 horse power. The printer must, however, have dependable power, always available every hour of the day or night. Dealing as he does with many intricate problems, and with much of his work performed with complicated machines, and nearly always under pressure for quick delivery, he can not afford to use a power which is not always reliable.

But the chief reason why the private plant is not suitable for a printing establishment is the wide variation in the amount of power required. At certain periods of the year, when he is overwhelmed with the work, the printer uses considerable power. At other times, when work is slack, his power consumption may drop as much as 90 per cent or more.

In the plant illustrated in this article each machine has its own individual motor—thus avoiding entirely overhead shafting, which it would be necessary to run at all times in order to operate even the smallest machine in the shop. As this main shafting with counters would absorb approximately $7\frac{1}{2}$ to 8 horse power, which is entirely saved by the use of individual motors, it is readily seen that even in a small shop this one item would in itself pay a substantial dividend on the entire cost of electrical equipment.

It is a far cry from the dismal holes in which once much



PLATE VIII

This battery of small presses has all its units driven with individual electric motors equipped with variable speed controllers

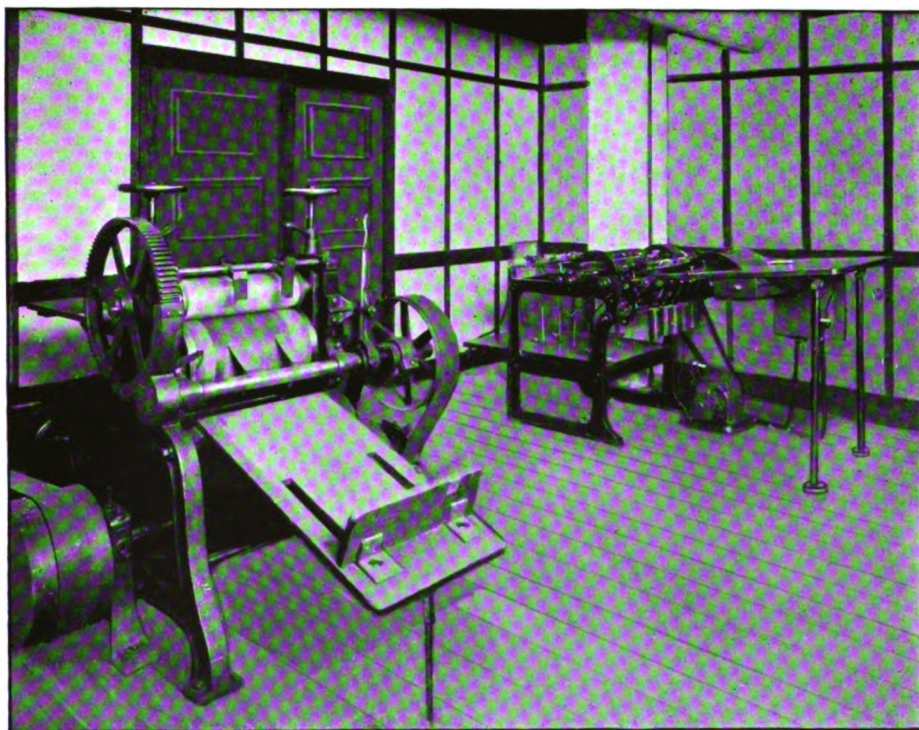


PLATE IX

At the right is shown a folding machine, and in the foreground appears a machine for giving a rough surface to smooth paper

printing was produced to the clean, well-lighted modern plants made possible by the individual motor drive. And cleanliness in a printing office is most essential if the best work is to be produced—as essential as it was in Pepys' day for the making of books "finely bound and truly colored."

The ink-besmeared printer's devil has gone the way of the itinerant printer who worked his passage from town to town subsisting on odd jobs in composition and press room. Rickety, low-ceilinged, poorly-lighted lofts, "suitable only for a printer," are now the exception rather than the rule. The modern printer's work centers around exactly what Gutenberg's did—printing words on paper, but from the simplest of handicrafts where the workman was his own paper maker, ink maker, and type founder, the business has grown until printing is now the sixth industry in the United States.

BUSINESS CONDITIONS IN STONE & WEBSTER LOCALITIES

The manager of the companies operated by Stone & Webster writes to Stone & Webster Management Association about the first of each month with reference to business conditions in their respective localities during the preceding month. A digest of these letters is published each month in the Stone & Webster Journal.

Amsterdam, N. Y., May 15th:

Bank clearings for April, 1917, were \$2,081,458, against \$2,060,820 last year.

During April, 1917, 11 building permits were issued, valued at \$5,175.

Post office receipts for April, 1917, were \$5,985, against \$7,109 last year.

The labor problem is still the only factor which limits the production of the various factories in this locality.

Ballston Spa, N. Y., May 15th:

Bank clearings for April, 1917, were \$594,084, against \$645,484 last year.

Post office receipts for April, 1917, were \$1,552, against \$1,452 last year.

All the factories are running at full capacity and have large orders ahead. The labor problem is steadily becoming more serious.

Beaumont, Tex., May 21st:

Bank clearings for April, 1917, were \$4,811,787, against \$3,573,386 last year.

During April, 1917, 72 building permits were issued, valued at \$106,107, against 63 last year, valued at \$75,819.

Post office receipts for April, 1917, were \$8,932, against \$9,142 last year.

All indications point to a very successful summer in Beaumont and the surrounding country. The oil refineries are employing a great deal of extra labor, as it is expected that the government will use a large amount of oil during the war. People are, however, showing a tendency toward conservatism in the spending of money.

The first unit of the municipal docks and warehouses, which have been under construction for the city of Beaumont, have now been completed.

Beaumont bids fair to become quite a shipbuilding center in the very near future. Five different concerns are negotiating for sites on the river front for shipyards. The Beaumont Ship Building & Dry Dock Company, owned by the Kirby Lumber interests of Houston, has secured a contract to build several ships for the government under the "wooden ship" policy.

The month of April was exceptionally cool and rainy, which interfered to some extent with spring planting.

The Port Arthur pleasure pier opened on April 15, which should increase the revenue of the Interurban during the summer months, as the country road between Beaumont and Port Arthur is in poor condition and not conducive to automobile riding.

On April 8 the Jefferson County Traction Company had the largest business in its history, which can be accounted for only by the general prosperity and good will of the public.

Bellingham, Wash., May 12th:

Building permits at Bellingham for April, 1917, were valued at \$13,-480, against \$21,911 last year.

Post office receipts at Bellingham, for April, 1917, were \$6,155, against \$6,151 last year.

Post office receipts at Mt. Vernon, Burlington, and Sedro Woolley combined for April, 1917, were \$2,845, against \$2,436 last year.

Business conditions at Bellingham continue at a high pressure. The cement mills are getting more orders than at this time a year ago; the canneries are receiving a few of the advance guard of the salmon schools; the shipyards are using every available man; and the lumber products industry is in such shape that both lumber and logs are selling within one dollar a thousand of the highest prices ever obtained. The car shortage has been noticeably relieved during the past month, and while mills could use more cars than they can obtain, the situation is much better than it has been. The principal difficulties for this industry now are the shortage of ships and the shortage of mill and camp labor.

The street railway receipts for April are better than a year ago, and light and power earnings are expected to show a gain despite the fact that the local cement mill was practically closed down during the month.

Conditions in the Skagit valley have been generally very good. Retail business in Mt. Vernon was somewhat impaired by the departure of the militia company, which took away many of the younger business men. The war situation has not otherwise adversely affected business. Weather conditions during April were fair and considerable plowing and planting was done. The crops will be about a month later than normal; in other words, about as they were last year. Freight business increased about 10 per cent over a year ago. Passenger travel increased somewhat. The cement plants operated more steadily than a year ago.

It is announced that a wood shipyard is soon to be established at Anacortes.

Brockton, Mass., May 11th:

Savings bank deposits for April, 1917, were \$14,845,721, against \$13,594,034 last year.

Bank clearings for April, 1917, were \$12,626,693.

During April, 1917, 44 building permits were issued, valued at \$53,882, against 87 last year, valued at \$100,110.

Post office receipts for April, 1917, were \$22,371.

Shoe shipments for April, 1917, were 52,115 cases, a decrease of 24,182 cases from last year.

The Sterling Motor Company, a plant operated on the service of the

Edison Electric Illuminating Company, has begun work on 600,000 one pound shells for the United States government. Brockton shoe factories are making trial orders and hope to receive a big part of the 4,000,000 pair of shoes order to be placed by the War Department.

Brockton has subscribed \$200,000 to the war loan, the Brockton National and the Home National Bank subscribing \$100,000 each.

Canastota, N. Y., May 15th:

Bank clearings for April, 1917, were \$100,455, against \$113,790 last year.

Post office receipts for April, 1917, were \$1,104, against \$1,270 last year.

Columbus, Ga., May 17th:

Bank clearings for April, 1917, were \$2,075,430, against \$1,926,600 last year.

During April, 1917, 3 building permits were issued, valued at \$14,100, against 4 last year, valued at \$94,500.

Post office receipts for April, 1917, were \$7,591, against \$6,856 last year.

The increase in bank clearings was the result of the sale of several large lots of cotton at good prices, and of a general soundness in business among wholesalers and retailers.

Continued cool weather is keeping crops back and many planters are badly handicapped by lack of labor.

The mills are busy and several of them have orders for future output covering several months.

The receipts of the Columbus Railroad Company for April, 1917, showed a good increase over the corresponding period of 1916.

The April receipts of the Columbus Power Company were handsomely in excess of last year.

Dallas, Tex., May 5th:

Building permits for April, 1917, were valued at \$190,730, against \$186,351 last year.

Real estate transfers for April, 1917, were \$2,293,624, against \$1,975,689 last year.

Post office receipts for April, 1917, were \$107,415, against \$104,583 last year.

For the past ten days there has been some falling off in general business, but this will probably be regarded as temporary.

While many sections of the state are in need of rain and spring is unusually backward, crop conditions in north and central Texas are nevertheless very good at this time.

The earnings of our lighting company continue to show substantial increase over last year. This is the case with the railway department also, despite the fact that the jitneys continue to run without regulation. Our increase in earnings may be considered as indexing improved general business conditions.

Dallas City, Ill., May 7th:

Bank clearings for April, 1917, were \$394,220, against \$330,970 last year.

Post office receipts for April, 1917, were \$393, against \$360 last year.

There has been very little change in business conditions. The weather has retarded farm work for the past two or three weeks. The Dallas City merchants depend greatly upon the neighboring farmers, and the weather conditions have made the latter rather pessimistic. The bad state of the roads have also prevented the farmers from getting to the city. Weather conditions, however, have changed at this writing and a few more warm, bright days should relieve both city and country people of their pessimism.

Everett, Wash., May 11th:

During April, 1917, 33 building permits were issued, valued at \$61,855, against 60 last year, valued at \$21,448. This large increase in valuation is due to the authorized construction of an addition to one of the public schools.

Post office receipts for April, 1917, were \$6,271, against \$7,368 last year.

The car shortage continues to be just as serious as it has been for several months past. Mill men are getting discouraged and there is no indication of any improvement in the near future. Prices are strengthening. It was recently announced to the local lumber men that the government would want about 740,000,000 feet of timber from the North Pacific Coast mill within a short time. Lumbermen of the northwest have held a meeting with the representative of the government and have succeeded in agreeing upon a practicable set of specifications to cover the business.

Fall River, Mass., May 4th:

Bank clearings for April, 1917, were \$8,932,423, against \$7,121,786 last year.

During April, 1917, 40 building permits were issued, against 88 last year.

Post office receipts for April, 1917, were \$14,446, against \$14,715 last year.

The cotton cloth business continues good, the earnings of the past quarter being among the largest in the city's history.

Conditions appear to favor a continuance of the present large earnings of our company.

Fort Madison, Ia., May 5th:

Bank clearings for April, 1917, were \$1,401,230, against \$1,027,346 last year.

Post office receipts for April, 1917, were \$2,019, against \$2,066 last year.

General business conditions as a whole continue satisfactory, although the weather during the past two weeks has been very unseasonable. We have had rain, snow, and cold weather for some days, which has delayed

planting considerably. The delay, however, is not considered serious enough to cause anxiety.

The construction of the Montgomery Ward & Company's paper mill continues to progress rapidly. The Fork & Hoe Company is engaged in building a third unit. The plant of the Water Company is rapidly reaching completion.

The business of the Fort Madison Electric Company continues to show an increase.

Fort Worth, Tex., May 3rd:

Bank clearings for April, 1917, were \$47,108,389, against \$31,228,362 last year.

During April, 1917, 55 building permits were issued, valued at \$247,065, against 94 last year, valued at \$221,298.

Post office receipts for April, 1917, were \$39,154, against \$35,080 last year.

The Stockyard receipts for April, 1917, showed large increases in the matter of cattle and hogs, with a falling off in sheep.

General business conditions are very good, particularly with the elevator and flour mills, and the live stock industry. The war has not had any very noticeable effect. There is, however, an increasing tendency in economy on the part of individuals and toward conservative buying by merchants. An effort has been made to increase farm production by putting more land under cultivation.

Over four inches of rain have fallen during the month, putting crops in excellent condition, though they are not as far advanced as usual on account of continued cool weather.

Our railway receipts for April, 1917, showed an increase of 20 per cent over last year, owing to better general business conditions, absence of jitneys, and favorable weather.

Cleburne reports are to the effect that general conditions remain satisfactory, without any important change during the past month. Crop conditions are very good. The receipts of the Tarrant County Traction Company for April, 1917, showed an increase of 12 per cent over last year.

Galveston, Tex., May 3rd:

Bank clearings for April, 1917, were \$17,098,727, against \$16,748,919 last year.

The volume of business for April, 1917, was \$96,134,000, against \$89,816,000 last year.

During April, 1917, 123 building permits were issued, valued at \$19,435, against 176 last year, valued at \$52,168.

Post office receipts for April, 1917, were \$13,742, against \$15,188 last year.

Exports continue to decrease, owing to the difficulty in securing vessels notwithstanding strenuous efforts by the Galveston Wharf Company and other organizations to improve conditions. Imports during the month were \$1,050,404, or practically a quarter of a million dollars more than they were a year ago. The gain came largely from a heavy volume of sugar traffic with Cuba, root sugar being brought in to the value of \$768,000

and crude oil from the Mexican field to the value of \$220,000. Barring the radical change in the shipping situation, the inward movement of Cuban sugar will, it is expected, continue throughout the summer.

Through freight rates from eastern ports to interior Texas ports via Galveston must not be observed, this being a recent ruling of the Interstate Commerce Commission. Formerly, commodities could be shipped by water to Galveston and from here reconsigned to interior towns at a total freight cost that was less than the through rate. At this juncture it is impossible to say whether the Commission's ruling will affect the incoming coastwise shipments adversely or not.

Glens Falls, N. Y., May 15th:

Bank clearings for April, 1917, were \$1,014,248, against \$1,013,312 last year.

Post office receipts for April, 1917, were \$6,112, against \$5,400 last year.

All the mills and factories are running full time and report very good prospects for a continued season of activity.

Retail trade, however, seems rather dull, owing probably to the prolonged cold weather.

Haverhill, Mass., May 16th:

Savings bank deposits on April 30, 1917, were \$14,297,418, against \$13,402,998 last year.

During April, 1917, 30 building permits were issued, valued at \$39,160, against 46 last year, valued at \$154,100.

General business conditions are fair.

Houghton, Mich., May 10th:

Post office receipts at Houghton for April, 1917, were \$2,878, against \$3,212 last year; at Hancock they were \$2,735, against \$2,367; at Calumet, \$2,911, against \$2,899; at Laurium, \$1,128, against \$1,127; at Lake Linden, \$471, against \$462; at Hubbell, \$350, against \$381.

It was expected that there would be some decrease in the copper production of this region during April, but this decrease was considerably greater than was looked for, being 12 per cent below the March figures.

General business conditions are exceptionally good, and this is reflected in the earnings of our companies, which are materially higher than last year.

Our house wiring campaign is progressing steadily. During the month 68 old houses were wired in the Houghton and Calumet division.

The Isle Royale Copper Company has announced that it will build 50 new houses for its employees immediately. These houses will be wired for electricity, which the Houghton County Electric Light Company will furnish.

Houston, Tex., May 10th:

Bank clearings for April, 1917, were \$47,593,422, against \$38,225,714 last year.

During April, 1917, 198 building permits were issued, valued at \$349,116, against 276 last year, valued at \$143,213.

Real estate transfers for April, 1917, were \$867,267, against \$599,427 last year.

Post office receipts for April, 1917, were \$52,760, against \$52,707 last year.

General business conditions in and around Houston are not as favorable as reported a month ago. In the country, the merchants report trade as dull and stocks as heavy. The jobbing trade in the city is reported fair, but retail trade is gradually slowing up. Manufacturing, however, continues active. On the whole, a spirit of conservatism is noted among all business interests.

Recent rain throughout this section of the state has brought about an appreciable improvement in crop conditions, and has somewhat improved the feeling of the farmers and merchants.

The receipts of the Houston Electric Company for April, 1917, show an increase of 7.24 per cent over last year.

Keokuk, Ia., May 5th:

Post office receipts for April, 1917, were \$6,983, against \$6,697 last year.

General business conditions continue to show improvement over the previous year in spite of the prevailing high prices for all food products. The wholesale grocers are taxed to their capacity. During the early part of April, a new department store opened for business and this has attracted a great many out-of-town people to the city.

Key West, Fla., May 4th:

Post office receipts for April, 1917, were \$1,849, against \$2,123 last year.

Customs receipts for April, 1917, were \$67,646, against \$46,467 last year.

The cigar output for April, 1917, was 6,467,586 cigars, against 3,686,233 cigars last year.

Orders for cigars continue to arrive spasmodically and manufacturers are not inclined to make provisions for the future very far ahead. Three of the largest cigar factories were closed for ten days during April, and other factories operated with reduced forces.

Lake George, N. Y., May 15th:

Post office receipts for April, 1917, were \$304, against \$338 last year.

The outlook for summer business for Lake George is very good. The prospects are that it will be an early season.

Lowell, Mass., May 14th:

Bank clearings for April, 1917, were \$4,770,499, against \$4,213,314 last year.

During April, 1917, 100 building permits were issued, valued at \$275,600, against 113 last year, valued at \$117,885.

Post office receipts for April, 1917, were \$18,476, against \$16,602 last year.

The war has not yet curtailed general business appreciably. Several industries have been more active, particularly the munition factories, which have all received orders from our government. A few of the textile mills are also working on government orders.

During April a satisfactory increase was shown in the house lighting customers of our company. The wiring of new houses continues very good. Income from the sale of appliances continues very good, a gratifying increase over the corresponding month of 1916 being shown. More than 175 horse power in motors to be added to our lines was secured during April.

The sale of current for power in munition plants is already on the increase, some factories operating on twenty-four hour schedule, and this, it is understood, is to continue for one year or more.

Oneida, N. Y., May 15th:

Bank clearings for April, 1917, were \$528,175, against \$394,562 last year.

Post office receipts for April, 1917, were \$3,446, against \$2,926 last year.

The volume of general business seems to hold up very well. The usual spring slump is not noticeable to any considerable extent this year.

Paducah, Ky., May 5th:

Bank clearings for April, 1917, were \$5,156,319, against \$4,504,551 last year.

The increase in bank clearings reflects the high prices and activity in the tobacco industry.

General business conditions are comparatively satisfactory. The branch plant of the American Cigar Company, which, as we stated a month ago, had started operating with a force of 75 girls, has increased the number to 150.

Pawtucket, R. I., May 5th:

The banks report an increase of 3 per cent in commercial accounts, and an increase of 15 per cent in savings accounts over last year.

During April, 1917, 9 building permits were issued, valued at \$68,650, against 11 last year, valued at \$59,450.

Post office receipts for April, 1917, were \$14,854, against \$14,310 last year.

Excellent business conditions still prevail and many of the larger machine concerns are refusing orders for early delivery, as they have enough on hand to keep them fully employed into next April. Many of the mills have received orders from garment makers for special lines in connection with government contracts, calling for army and navy equipment. Not much publicity is being given to the government orders, but many large orders are known to have been placed and more are expected shortly.

All the textile mills are running full forces and overtime in order to complete orders. One of the larger fancy textile concerns is turning out goods amounting to \$70,000 a week and has orders sufficient to keep that

pace for nine months longer. Practically every concern in this section of the state has orders enough to keep it busy for months to come and the orders still continue to pour in at excellent prices.

Retail merchants report greatly improved conditions over a year ago, 18 per cent in fact over April, 1916.

Pensacola, Fla., May 5th:

Post office receipts for April, 1917, were \$7,314, against \$8,004 last year.

Owing to the scarcity of tonnage, general business in this community has been quiet the past month.

The receipts of our company for April, 1917, show an increase over last year.

Ponce, Porto Rico, May 14th:

Post office receipts for April, 1917, were \$2,480, against \$2,476 last year.

Coffee shipments for April, 1917, were 1,141,551 pounds, valued at \$156,517. Sugar shipments were 16,647,395 pounds, valued at \$916,858. Tobacco shipments were valued at \$119,415.

Despite the high price of commodities, Ponce merchants report normal sales.

Our railway receipts for April, 1917, showed an increase of 12 per cent over the previous year.

Port Arthur, Tex., May 15th:

Building permits for April, 1917, were valued at \$42,105, against \$49,664 last year.

Post office receipts for April, 1917, were \$4,432, against \$3,963 last year.

Exports of the Sabine District for April, 1917, were \$3,463,402, against \$2,275,699 last year.

Imports for April, 1917, were \$267,149, against \$208,352 last year.

Custom house receipts for April, 1917, were \$4,421, against \$2,590 last year.

The Long-Bell Lumber Company of Kansas City, which has had terminals in Port Arthur, has decided to establish a shipyard near its docks. It is reported that work is to be begun very shortly on two large wooden ships, with the prospect of more being contracted for in the near future.

During April there were several good rains which were very beneficial to the crops.

Reno, Nev., May 21st:

Bank clearings for April, 1917, were \$2,106,507, against \$1,684,747 last year.

For the first four months of 1917, the bank clearings were \$7,987,410, against \$5,728,645 last year.

Building permits for April, 1917, were valued at \$24,515, against \$40,550 last year.

The April building permits include 7 new residences.

The outlook for general business for the immediate future is still very favorable, the only trouble at the present being a shortage of materials, due partly to slow freight service and partly to the demand in some lines exceeding the supply.

The weather has continued cold and disagreeable within the last four days. On May 15 the temperature dropped to 27, causing some damage to the fruit orchards. Owing to the late spring, crops were not far enough advanced to be seriously affected.

The receipts of the Reno General Electric Company and the Carson City Coal Gas Company for the first four months of 1917 showed a material increase over the previous year.

Within the last six weeks, we have connected to our lines 193 horse power motor capacity for irrigation pumping, which represents an increase of 50 horse power over the 1916 irrigation load in the same territory.

Saratoga Springs, N. Y., May 15th:

Bank clearings for April, 1917, were \$330,341, against \$279,587 last year.

Post office receipts for April, 1917, were \$4,199, against \$4,303 last year.

General business conditions remain practically unchanged. The season, however, has been later than usual.

Savannah, Ga., May 12th:

Bank clearings for April, 1917, were \$26,471,737, against \$17,886,535 last year.

During April, 1917, 41 building permits were issued, against 63 last year.

Post office receipts for April, 1917, were \$26,224, against \$24,622 last year.

Cotton receipts for April, 1917, were 22,170 bales, against 41,388 bales last year.

Turpentine receipts for April, 1917, were 3,188 barrels, against 3,968 barrels last year.

Resin receipts for April, 1917, were 11,264 barrels, against 11,772 barrels last year.

General business conditions have continued to hold their own for the last few months. Foreign cotton is not moving at all on account of the lack of tonnage.

The sugar refinery will begin refining sugar about June 1. The construction of the pulp mill at Port Wentworth is progressing favorably.

Our railway department showed a gain of 15.1 per cent for April, 1917, over the previous year. The light and power department showed an increase of 23.3 per cent, which reflects the condition of the manufacturing interests in this locality.

General business conditions in this section of the south continue prosperous. It is growing harder every day to get satisfactory labor, both white and colored. The negroes continue to go north in large numbers.

Seattle, Wash., May 18th:

Bank clearings for April, 1917, were \$89,810,000, against \$61,255,000 last year.

Building permits for April, 1917, were \$670,905, against \$556,510 last year.

Real estate transfers for April, 1917, were \$818,556, against \$1,111,445 last year.

During April, the usual activity was witnessed in Alaska shipping and in spring trade.

The weather was cold and backward and reports from wheat and potato growing centers show that about 25 per cent of the winter wheat will require re-seeding, and that the potato crop will be about a month later than last year.

Spring wheat will show an increase over last year in acreage and probably in yield per acre. Of the 1916 wheat, 9,000,000 bushels remained in the state May 1.

According to a report issued by the state of Washington, 40 new shipbuilding concerns were incorporated in this state last year, with aggregate capital of \$17,000,000. Mills near tide water are all busy cutting ship timbers and the activity is being reflected in all lines of retail and jobbing trade.

Coal mines are operating in excess of the tonnage for last year as a result of the advance in price of fuel oil.

Sydney, Nova Scotia, May 14th:

During April, 1917, 30 building permits were issued, valued at \$37,915, against 9 last year, valued at \$10,900.

Customs receipts for April, 1917, were \$38,418, against \$18,759 last year.

The output of the Dominion Coal Company for April, 1917, was 301,523 tons, against 346,178 tons last year. The shipments were 246,708 tons, against 263,155 tons last year.

The number of new residences in Sydney in process of construction is greater than at any time since 1913. The demand for houses exceeds the supply.

The By-Products Company of Canada has begun work on the \$3,000,000 addition to the coke ovens plant of the Dominion Iron & Steel Company.

Shipbuilding is engaging local attention. A local company has built a dry dock for small wood and steel vessels on the way to Sydney. This same company has been working on a large proposition, and from present indications there would seem to be a likelihood of a large shipbuilding plant being located in Sydney in the near future.

The labor situation is rapidly becoming worse. The steel plants and coal mines are employing every obtainable man.

Tacoma, Wash., May 10th:

Bank clearings for April, 1917, were \$42,617,529, against \$34,849,926 last year.

During April, 1917, 450 building permits were issued, valued at \$434,684, against 459 last year, valued at \$450,187.

Real estate transfers for April, 1917, were \$799,094, against \$848,928 last year.

Post office receipts for April, 1917, were \$96,526, against \$89,807 last year.

Numerous dwelling and business structures and a \$300,000 theatre and office building, are in process of construction. The present industries of the city, the lumber mills and wood-working plants, the Tacoma Smelter, The Northern Pacific and the Chicago, Milwaukee & St. Paul shops are working full time and labor is, therefore, well employed at good prices.

The Todd Drydock & Construction Company has contracts for six steel steamers of 8,000 tons each for the Cunard line and one steamer for the Barber Steamship Company of 8,000 tons. These seven ships will each run in cost in excess of \$1,000,000. Work at the Todd plant is being rushed and the dredging is 90 per cent complete. The Seaborn Shipbuilding Company now has three vessels under construction, which will cost approximately \$200,000 each.

The Washington Shipbuilding Company, whose plant is to be constructed on the middle waterway, holds contracts for seven 8,800-ton steel cargo ships to be built for allied interests, the cost of each to exceed \$1,000,000. Work on this plant has been started.

Other shipbuilding plants are also busy with the filling of orders, and it is reported that at the present time Tacoma shipyards have contracts amounting to \$15,000,000.

The State Grain Inspector has announced that the wheat crop in this state for 1917 will fall short of the 1916 crop by possibly 10,000,000 bushels, which would mean 35,000,000 bushels for this state, against 45,000,000 bushels last year and 55,000,000 bushels in 1915. At the request of the Public Service Commission, the State Grain Inspector recently made a survey of conditions throughout the state and reports that approximately 600,000 bushels of wheat are going out of this state weekly to eastern markets. Adding this to the amount milled in the state, which would be about 200,000 bushels, would make more than 3,000,000 bushels less in this state on May 1, about 9,000,000 bushels being left in the country warehouses of the state.

Through traffic on the Puget Sound Electric Railway has continued to show an increase; that for April, 1917, over April, 1916, being 90 per cent.

Local business is also showing a very good increase. On the city lines, earnings for the month of April ran about 97 per cent over last year, and coupled with Pacific Traction Company earnings showed an increase of about 117 per cent.

A second block of \$500,000 of army post bonds has been bought by the state, making the state's holdings \$1,000,000, or one-half of the total issue in connection with the 70,000 acre site for the establishment of an army post at American Lake. The other million dollars' worth of bonds will be offered later when the funds are needed for further acquisition of army post territory.

Tampa, Fla., May 10th:

Bank clearings for April, 1917, were \$5,197,250, against \$4,273,640 last year.

Building permits for April, 1917, were valued at \$111,093, against \$135,130 last year.

Post office receipts for April, 1917, were \$23,129, against \$19,859 last year.

Customs receipts for April, 1917, were \$162,407, against \$117,319 last year.

Internal revenue receipts for April, 1917, were \$83,880, against \$73,616 last year.

Water commerce for April, 1917, was valued at \$2,521,025, against \$2,694,202 last year.

Cigar manufactures for April, 1917, amounted to 27,215,396 cigars, against 22,925,000 cigars last year.

Shipbuilding on an extensive scale promises to become a future industry of Tampa. One steel steamer has just been completed and preparations for building immediately two additional steel vessels are now under way. The United States Government has awarded contracts to local contractors for ten submarine petrol boats and eight three thousand ton wooden vessels. Twelve local firms are seeking contracts to build wooden vessels for the government. Most of this industry will be located on the Estuary Channel, which is in the corporate limits of Tampa. This channel has a depth of twenty-four feet and a water frontage of two miles. Two firms contemplate locating on the ship canal at Port Tampa, provided contracts are secured from the government. This canal has a frontage of several miles available for such purposes. Much enthusiasm has been created in Tampa over this new industry.

Both our railway and our lighting department show an increase in receipts for April, 1917, over the previous year.

The Michigan Avenue jitneys stopped operating on the night of April 21. The owner has left Tampa and the jitneys are reported to have been taken over by those having financial claims against them.

Contracts between the city of Tampa and the Tampa Electric Company for furnishing lights on the Fortune and Lafayette Street bridges and motor service to operate the draw on the latter structure have been entered into for a term of five years. A contract to cover lighting of Tampa Bay Park for a period of five years has also been secured, the lights being placed upon a basis of all night burning.

Woonsocket, R. I., May 16th:

During April, 1917, 15 building permits were issued, valued at \$29,650, against 8 last year, valued at \$6,980.

Retail business is excellent; in fact, considerably above normal.

Textile mills and factories are receiving all the new orders that they can take care of for many months to come. There is a good deal of uneasiness, however, as to the coal situation and as to the possibility of serious labor shortage.

On the whole, however, the general business outlook appears to be excellent.

Our gas earnings for April, 1917, showed an increase of approximately 16 per cent over last year, and our electric earnings an increase of approximately 22 per cent.

News from the Companies

Boston Office

Mr. D. P. Robinson and Mr. G. O. Muhlfeld have returned from the Pacific Coast.

Mr. W. H. McGrath of the Puget Sound Traction, Light & Power Company has recently been to the Boston office.

Mr. George A. Campbell of Reno was here lately.

Mr. Fred F. Farnham of the treasurer's department has returned from Washington.

Mr. J. H. Oakes has returned to Washington for the summer.

Mr. A. L. P. Smith of the Savannah Electric Company spent several days at the Boston office.

Mr. R. W. Pratt of the statistical department has gone to New London, Conn.

Mr. H. H. Carpenter of the statistical department has gone to Woonsocket, R. I.

Mr. and Mrs. Robert Haydock announce the birth of a son on May 29, 1917.

On June 1 a Liberty Loan clock was installed on the first floor to register the progress of the subscriptions to the Liberty Loan.

The American Tube & Stamping Company has placed a contract with Stone & Webster for the design and construction of an addition to its plant at Bridgeport, Conn.

The General Bakelite Company of Perth Amboy, N. J., has awarded a contract to Stone & Webster for the construction of an addition to its plant. The General Bakelite Company is affiliated with the Roessler & Hasslacher Chemical Company, for which Stone & Webster are at present constructing a plant at Perth Amboy.

Baton Rouge, La.

During this month five hundred Boy Scouts from all parts of Louisiana were in Baton Rouge for the first mobilization of the Boy Scouts of America ever held in the South. Many instructive meetings and contests were held during the three days of the encampment and it was pronounced a great success by all who participated in the gathering.

On May 1 the gas rate of this company was reduced from \$1.50 to \$1.40 net per thousand cubic feet.

The four dials of the clock in the steeple of the St. Joseph Catholic Church have been illuminated with electric lights.

Mr. L. R. Nash of the Boston office, accompanied by Mrs. Nash, was in Baton Rouge for several days during the month.

Mr. John S. Bleecker of Columbus, Ga., made us a visit of several days.

Mr. H. B. Bettinger of the gas engineering department, who has been with us since the first of March, has returned to Boston.

Our manager, Mr. I. M. Stover, has announced the birth of a daughter, Edith Chase, on May 6.

Columbus, Ga.

Mr. A. A. Wilbur, assistant treasurer, left the Columbus Companies to accept service with the Brockton Gas Light Company, of Brockton, Mass., effective May 1. Mr. Wilbur was universally liked. Mr. L. H. Crowell, chief clerk, was promoted to fill the vacancy caused by Mr. Wilbur's leaving us, Mr. R. E. Ball being promoted to the position of chief clerk.

Mr. John S. Bleecker, manager, recently spent several days in Baton Rouge, La.

Mr. J. H. Vander Veer, of Tampa, Fla., recently spent several weeks here studying the question of street railway equipment, he and Mr. R. M. Harding, our general superintendent, having attended the recent conference in Fort Worth.

So far, our organization has lost two men to military service. Mr. R. W. Smith, of the engineering department, has enlisted in the Engineer Officers' Reserve and is now at the training camp at Fort McPherson, near Atlanta. Mr. John Huff, a clerk in the accounting department, has enlisted in the Regular Army.

The Columbus Chamber of Commerce adopted a resolution to make June 5, the day appointed for registration for selective conscription, a patriotic occasion. Our companies have eighty or ninety white men in their employ who are of the conscriptive ages, and it is planned to place an Honor Roll at conspicuous points about the premises, showing the names of those employees who have registered and are subject to their country's call.

Great interest has been taken by the people of Columbus in the Liberty Loan, our companies being the first to make an organized effort toward securing subscriptions to these bonds. On May 18 a meeting was held in the manager's office and the Columbus Electric and Gas Liberty Loan Club was organized, with Mr. John S. Bleecker as president.

Mr. MacD. Dexter, superintendent of the gas company, attended the convention of the Southern Gas Association, held in Roanoke, Va., on May 2, 3, and 4, and was elected on the board of directors of the association to serve two years. Mr. Dexter reports that the attendance at this convention was one of the best the association has ever had; that everyone reported doing a good business; and that a general feeling of optimism prevailed, the only obstacles feared being the high prices and scarcity of materials and the critical labor situation due to war conditions.

The Columbus Chamber of Commerce is endeavoring to get the government to establish at Columbus a training camp for one division of the new army that is to be raised. A government representative has been here looking over proposed sites.

Mr. W. D. Chalmers, of the accounting department, announces the birth of a daughter.

Galveston, Tex.

Our chief clerk, Mr. L. W. Emery, was called to Louisville during April by illness in his family and has only recently returned to Galveston.

Miss Gertrude Lemmerman, railway analysis clerk, has been granted leave of absence to accompany her mother to the health resort at Mineral Wells, Tex.

The need of increased food production seems to have been grasped by Galvestonians, and a vacant lot or yard without its garden is an exception. Recently an exhibit of garden products was held by the Woman's Health Protective Association, to which some two hundred amateur gardeners sent contributions. The exhibition proved such a success that it is planned to duplicate it on a somewhat larger scale next year.

The citizen's training corps, organized two months ago, is still holding semi-weekly drills with an average attendance of more than 500. It is hoped that regulation uniforms, and possibly rifles, may be acquired in the near future. Galveston's quota for the Officers' Training Camp at Leon Springs was obtained in a few days, eighty men being accepted, and applications from many times this number being necessarily refused. The Red Cross is extending its activities rapidly, there being at present at least thirty First Aid Classes in regular session, besides auxiliary organizations for the making of garments and hospital supplies.

A corporation has been formed and franchise granted for a ship-building plant at Pelican Island, across the bay from Galveston. While no contracts have yet been received, the company seems to have assurance of some of the business to be distributed under the government plan for more wooden ships.

Jacksonville, Fla.

Mr. J. H. Vander Veer, betterment engineer, was with us for a few days in the early part of May.

Mr. C. J. Harvin, of the engineering division, tested our power station meters during the middle of May.

Mr. L. M. Bragg, formerly connected with this company, and more recently with the Key West Electric Company, passed through Jacksonville recently on his way to the Fort McPherson, Ga., training camp for army reserve officers.

Mr. L. E. Davis has entered the employ of the company in the capacity of student engineer at the power station.

The barge "Belfast" unloaded a 1500-ton cargo of coal at our power station pier recently.

The Employees' Benefit Association of this company is inaugurating a co-operative grocery store where foodstuffs will be sold to members at cost. All members are enthusiastic over the idea and a considerable lessening of living expenses is anticipated. The company is furnishing space for the store at one end of the car barn building.

Several of our company officials and other employees are actively backing the "plant-a-garden" movement.

In addition to the shipbuilding contracts previously mentioned in the Stone & Webster Journal as having been let to Jacksonville concerns, it is announced that the Mason Forwarding Company will build three 3,000-ton wooden vessels for the Federal Shipping Board; also that the Gibbs Gas Engine Company of South Jacksonville will construct immediately five 110-foot wooden submarine chasers for the United States Government.

There is much activity at the several local shipbuilding plants, and rumors are current that other shipbuilding plants are to be established here shortly. It is conservatively estimated that forty vessels, both wooden and steel, will be constructed during the next twelve months at this port.

Work is being pushed at Armour & Company's packing plant, where the present facilities are being doubled. The present plant was only established last fall and this early expansion is quite significant.

A company composed of local grain dealers contemplates the early erection of a large grain elevator in this city. This proposed facility is necessitated by the increasing amount of corn now being produced in the state of Florida.

Keokuk, Ia.

At a meeting of the High Tension Club in the Y. W. C. A. auditorium, on April 19, a lecture entitled "Winning the West" was delivered by Mr. R. H. Bolster, hydraulic engineer of the Mississippi River Power Company. This lecture illustrated with lantern slides was descriptive of the work accomplished by the United States Reclamation Service in irrigation projects which have made available for cultivation vast areas of the arid lands of the west. Preceding the lecture, a short musical program was given by Mrs. Paul King and Miss Catharine Reidy. Just before adjournment all members of the club and guests who were present joined in singing "The Star-Spangled Banner."

On May 18 the club held a business session in the club rooms over the offices of the Keokuk Electric Company. Mr. C. W. Kellogg addressed the membership on the subject, "The Public Utility's Relation to the War." Plans for a rifle shooting contest to be held in the near future were discussed.

Several men from Keokuk have been accepted for the Officers' Training Camp at Fort Snelling, Minn., and reported for duty on May 14. A number of employees of the local Stone & Webster companies were recently given a preliminary examination at Burlington, Ia., by Captain Welshmier of the United States Army. Several of the men passed with high grades but have not as yet been called to the training camp.

On May 14, Lieutenant Colonel George M. Hoffman, United States Engineer Corps in charge of the upper Mississippi River from St. Paul to the mouth of the Missouri, with headquarters at Rock Island, was transferred by the War Department to the Officers' Training Camp at Fort Benjamin Harrison, Ind. Major General A. Mackenzie retired, for sixteen years in charge of the upper Mississippi River district until 1895, and later, after his transfer to Washington, chief of the Engineer Corps of the United States Army, was called back into active service to fill the position left vacant by Colonel Hoffman's transfer.

Mr. J. L. Rodgers, superintendent of the River Smelting & Refining Company, a graduate of Annapolis and a member of the Naval Reserve was called to active service on May 11, and left Keokuk for New York city, where he will be assigned for duty at present.

The local press has recently announced the probable formation of a large line to operate on the Mississippi river during the coming season between St. Paul and St. Louis. The new company proposes to put in operation eighteen 1000-ton barges to be towed in series of six by powerful tugs. Northern interests propose to ship iron ore, flour, wheat and other Minnesota products, while on the up-river trips the barges will be loaded with Illinois coal and Southern hard wood. The erection of modern

river terminals at Minneapolis, Davenport, and Muscatine, and plans for the erection of similar terminals at St. Paul and other river cities, have greatly influenced the establishment of this new packet line.

Mississippi River Power Company

Work of construction on the second 11,000-volt transmission circuit to the plant of the Keokuk Electro-Metals Company is progressing satisfactorily. An additional lead cable has been drawn into the duct line between the Keokuk power station and the terminal house on the Iowa shore. Just south of the terminal building a steel switching structure has been erected on which are mounted 11,000-volt air break switches, through which the overhead circuits to the Electro-Metals plant will be supplied. Construction of the extension to the plant of the Electro-Metals Company is well under way and a considerable amount of the material necessary for the new furnaces is already on the ground.

Material for the construction of the 11,000-volt transmission line now being built from Keokuk to Montrose, Ia., has been received and distributed. A large number of poles have been framed and set and the overhead work will probably be entirely completed by June.

Messrs. C. W. Kellogg, C. A. Sears, J. H. Bissell and Eugene Maxwell were in Springfield, Ill., on May 15 and 16, to meet with the State Public Utilities Commission.

Mr. and Mrs. C. W. Kellogg announce the birth of a daughter, Agnes, on April 23.

Key West, Fla.

The Florida East Coast Railway Company has requested that Trumbo Terminals be disconnected from the city limits for a period of ten years, agreeing as a return to build and operate a 200-room tourist hotel in the city of Key West, the said hotel and grounds to cost approximately \$250,000. An informal election was held for the purpose of expressing to the members of the Legislature the desire of the electors. An unusually heavy vote was cast, the count showing that fully ninety per cent of the voters were favorable to the acceptance of the offer. The governor's signature to this bill was secured.

Colonel Hevia, Secretary of Interior, Havana, Cuba, en route to Annapolis, arrived on the presidential yacht "Hatuey." The "Hatuey" was met in the outer harbor by the U. S. S. "Peoria," which served as an escort for the little ship until salutes were exchanged and the "Hatuey" arrived safely at her anchorage. Colonel Hevia and party were transferred to the "Peoria." At the P. & O. docks they were met by the commandant of the United States Naval Station and amid strains of the national anthem courtesies were exchanged. The entire party were the guests of Commandant and Mrs. W. J. Terhune during their short stay in the city.

The Southern Bell Telephone and Telegraph Company expects shortly to occupy the Automatic Exchange Building on Southard and Simonton streets. The overhead wires of the Bell will be a thing of the past and the underground system of the Automatic will be used.

Lester M. Bragg, who has been associated with this company since December, 1916, has been granted an indefinite leave of absence from

this organization and is attending the Reserve Officers' Training Camp at Fort McPherson, Ga.

Mr. James E. Murray, our office champion, while engaged in a friendly wrestling bout, suffered the fracture of two ribs and will probably be confined for a few days.

About two hundred Naval Reserves are in camp in the old P. & O. Building at the foot of Duval street and are undergoing thorough training for active service.

The men of the U. S. S. "Denver" entertained their many friends with a grand ball at the Athletic Club on May 26. The hall was beautifully decorated with ribbons of red, white and blue and flags of every nation, surpassing anything of the kind in the history of Key West. The club was crowded to its utmost capacity.

Our company has tried to do its part for the country by displaying on its street cars "Liberty Bonds" banners.

Sunday, June 3, an excursion from Miami ran into Key West bringing many friends and relatives of the Miami boys who are members of the Naval Reserves.

Lowell, Mass.

The Liberty Loan has "caught on" in Lowell. The employees of our company have started under an organized plan to be known as "The Lowell Electric Light Corporation Employees' Liberty Loan Club." The company finances the whole transaction and resells the bonds to the men.

Recently the local Red Cross organization instituted a "Tag Day" to raise funds for Red Cross work. This met with great success, \$6900 being added to the local treasury.

Mr. Percy J. Wilson, our power sales engineer, has attained the rank of captain in the Officers' Reserve Corps, U. S. army, and has left for Fort Niagara training camp. His place will be taken temporarily in the company by Percival R. Moody of the power department.

Mr. Sumner T. Pike, our chief clerk, received an appointment to the Officers' Reserve Corps, and has left for the New England Training Camp at Plattsburg, N. Y.

Miss Gertrude Sheppard has joined the clerical force of our accounting department during the month.

The new Strand Theatre Building on Central street is nearing completion, and represents an outlay of \$150,000.

Pensacola, Fla.

Work has commenced on the construction of the new dry docks of the Bruce Dry Dock Company. Dredging operations are in progress, reclaiming land and dredging to depth. The plant will be completed in about eight months.

Mr. F. M. Blount, of this city, has secured a contract for the construction of four submarine chasers. These will be built at Bay Point, near Pensacola.

The Gulf, Florida & Alabama has gone into the hands of a receiver, through a friendly receivership action. Mr. F. E. Dewey of New York is the receiver of the road, with P. D. Beal of Pensacola as co-receiver.

Authority has been granted for the issuance of half million dollars in receivers' certificates for improvements, and it is expected that work will begin immediately.

A number of young men of Pensacola have stood the examination for the Officers' Reserve Corps, and are now at Fort McPherson for training.

Two new companies of militia have been organized in the city and have been mustered into the Federal Service.

The old East Pensacola car line, built in 1910 by a real estate development company, has been sold by the receivers of the company as scrap and will shortly be wrecked.

Bayview Park opened on May 1 with a large attendance of swimmers. Owing to the fact that the bathing pavilions on Santa Rosa Island will not operate this year, Bayview should be very popular. This resort is located on our East Hill car line.

Savannah, Ga.

Mr. Edward Reynolds, Jr., who was recently transferred to the accounting department from the Boston office, has left the organization and returned to Boston to enter the Naval Reserve.

Mr. A. B. Fink, of the engineering department, and Mr. R. McL. Hull, cashier, have had their applications for admission to the Officers' Reserve Training Corps accepted and have left for Atlanta, where they will go into training at Fort McPherson.

A camp for recruits enlisted in the First Georgia Regiment of Infantry has been established in the old Ball Park and several hundred men are in training there. It is expected that this number will be added to from time to time and that a large camp will be maintained.

Work on the extension of a power line to Port Wentworth is progressing rapidly and it is hoped that service connections can be made in the near future.

Mr. J. O. Brown of the commercial department has returned from a visit to his home in Columbus, where he was called by the illness of his mother.

The men in the transportation department are in possession of a Victrola recently won in a voting contest conducted by a local business house. They greatly appreciate the aid which they received from the trainmen of the Florida companies, the Tampa men being especially liberal in their support.

Seattle, Wash.

The address by Stone & Webster to the employees of their organization all over the country has attracted a great deal of local attention; the newspapers have given the circular much attention and the *Puget Sound Electric Journal* for May printed the patriotic document in full.

Every social activity in the companies of the Pacific Northwest has been given a serious turn or abandoned altogether. It was announced that at the annual meeting of the Stone & Webster Club of Washington, May 16, the speaker would be Sergeant G. Lyall Fraser of Vancouver, B. C., just returned from the European battle front, who would talk of

the World War. Ordinarily the May meeting and election of officers of the club is a joyous, not to say frivolous, affair, but this year's event has been arranged in quite another spirit.

The Safety Committee reorganization and semi-annual dinner to the new members occurred on the night of April 4 at the Washington Annex hotel. There was a card of speakers who addressed those in attendance on the work of the safety movement in this company and what had been accomplished by organization for safety. The principal speaker of the evening was Mr. A. M. Lee, of the Northern Pacific Railway, whose subject, "What the Steam Roads Have Done for Safety," was a timely contribution and decidedly enlightening to many who had supposed that the safety movement was confined to electric lines. Other speakers were Mr. J. D. Nice, superintendent of Division 2; Mr. John Harisberger, general superintendent of light and power; Mr. A. J. Faulknor of the legal department, and Mr. D. W. Henderson, superintendent of transportation. Mr. F. M. Hamilton, superintendent of the department of accident investigation acted as toastmaster.

A circular has been posted in the various departments of the company endorsing the Red Cross and encouraging its support. The circular is signed by Mr. A. L. Kempster, manager, and Frank Dabney, assistant treasurer, as a committee.

Mr. John Harisberger, general superintendent of the light and power department, with the rank of captain in the United States army Engineers' Reserve Corps, and Edgar R. Perry, with a commission as lieutenant in the same branch of the service, left Seattle May 6 for San Francisco, to report May 8 at the Presidio for instructions. A letter received from Mr. Harisberger announces his arrival at the training camp and tells of the military activities at that station. An official order has been published by Manager A. L. Kempster setting out the temporary organization in the light and power department during Mr. Harisberger's absence.

A. R. Haynes, chief operator at the White River generating station, has received a commission as captain in the Engineers' Corps, and is now at the Presidio.

A census is being taken of the various departments of the company organization for men of serviceable age and qualifications, setting forth what occupations they have followed at other times in their careers, what military training they have had (if any) and what changes in the matter of their own occupations they would prefer if opportunity offered. This census includes everybody from officials down to the newest names on the pay roll.

The bringing of steam heating service from the company's central plant to the Electric building will admit of the isolated heating plant now in the sub-basement being taken out and the space applied to the installation of a sub-station, where a 500 kilowatt machine will be set up, transferred from the Union street station.

COUPONS AND DIVIDENDS DUE

	Per Cent.
June 1, Baton Rouge Electric Company, Preferred Stock, 6 per cent.	3
June 1, Baton Rouge Electric Company, Common Stock, 8 per cent.	4
June 1, Berkshire Power Company, The, 5s, 1934.	2½
June 1, Blackstone Valley Gas and Electric Company Preferred Stock, 6 per cent.	3
June 1, *Blackstone Valley Gas and Electric Company, Common Stock.	2
June 1, Bridgewater Electric Company, The, 5s, 1920. .	2½
June 1, Brockton and Plymouth Street Railway Company, 4½s, 1920.	2¼
June 1, *Central Mississippi Valley Electric Properties, preferred shares, 6 per cent.	1½
June 1, *Connecticut Power Company, The, Preferred Stock, 6 per cent.	1½
June 1, Eastern Texas Electric Company 6s (Coupon Notes), 1918.	3
June 1, Edison Electric Illuminating Company of Brockton, 5s, 1930.	2½
June 1, *Northern Texas Electric Company, Common Stock.	1
June 1, Pawtucket Gas Company of New Jersey, The, Preferred Stock, 5 per cent.	2½
June 1, Pensacola Electric Company, Preferred Stock, 6 per cent.	3
June 1, Puget Sound Power Company, 5s, 1933.	2½
June 1, Tampa Electric Company, 5s, 1933.	2½
June 15, *El Paso Electric Company, Common Stock. .	2½
July 1, Blackstone Valley Gas and Electric Company, 5s, 1939.	2½
July 1, Cape Breton Electric Company, Ltd., 5s, 1932. .	2½
July 1, Columbus Electric Company, 6s, 1917.	3
July 1, Columbus Electric Company, Preferred Stock, 6 per cent.	3
July 1, Connecticut Power Company, The, 5s, 1956. .	2½
July 1, Dallas Electric Company, Term. Mortgage Notes, 1921.	2½

*Payable quarterly.

		Per Cent.
July 1,	Eastern Texas Electric Company, Preferred Stock, 6 per cent.	3
July 1,	Electric Light and Power Company of Abington and Rockland, The, Capital Stock.	4
July 1,	El Paso Electric Company, 5s, 1932.	2½
July 1,	*Haverhill Gas Light Company, Capital Stock	2¼
July 1,	Houghton County Electric Light Company, 5s, 1927.	2½
July 1,	Houghton County Street Railway Company, The, 5s, 1920.	2½
July 1,	Houghton County Traction Company, 5s, 1937	2½
July 1,	Keokuk Electric Railway & Power Company, 5s, 1925.	2½
July 1,	Mississippi River Power Company, 5s, 1951.	2½
July 1,	New London Gas and Electric Company, The, 5s, 1933.	2½
July 1,	Northern Texas Electric Company, 5s, 1940. . .	2½
July 1,	Northern Texas Traction Company, 5s, 1933. .	2½
July 1,	Paducah City Railway, Inc., The, 5s, 1932. . .	2½
July 1,	Paducah Street Railway Company, Inc., 6s, 1920.	3
July 1,	Paducah Street Railway Company, Inc., 6s, 1923.	3
July 1,	Pawtucket Electric Company, 5s, 1938.	2½
July 1,	Pensacola Electric Company, 6s (Coupon Notes), 1919.	3
July 1,	Reno Power, Light & Water Company, 6s, 1944	3
July 1,	Savannah Electric Company, 5s, 1952.	2½
July 1,	Savannah, Thunderbolt and Isle of Hope Railway, The, 4s, 1947.	1
July 1,	Sydney and Glace Bay Railway Company, Ltd., 5s, 1932.	2½
July 1,	Woonsocket Electric Machine and Power Company, 4½s, 1931.	2¼
July 9,	El Paso Electric Company, Preferred Stock, 6 per cent.	3
July 15,	Keokuk Gas Light and Coke Company 5s, 1918	2½
July 15,	*Puget Sound Traction, Light & Power Company, Preferred Stock.	\$.75

*Payable quarterly.

Dividend rates are based on the last declaration.

Quotations on Securities

OF

Companies under Stone & Webster Management

MAY 31, 1917

The Securities Department executes orders on commission for those wishing to purchase or sell.
Requests for information in regard to the companies will be answered promptly.

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Abington & Rockland, The El. Lt. & Pr. Co. of	5%	100	No	Pref	8%	165
Baton Rouge Elec. Co. { Bond, 1939 Notes, April, 1918	5%	90	6%	90		.....
	6%	100				
Blackstone Valley Gas & Elec. Co.	5%	102½	*6%	107	8%	160
Blue Hill St. Ry. Co., The	5%	91	No	Pref		.....
Brockton & Plymouth St. Ry. Co.	4½%	91	*6%			
Cape Breton Elec. Co., Ltd.	5%	91	6%	80	3%	50
Central Mississippi Valley Electric Properties	No	Bonds	*6%	75		10 N
Columbus Elec. Co. { Bonds, 1933 Notes, July, 1917	5%	90	6%	83		35
	6%	100				
Columbus Power Co., The	5%	94		.....		.....
Connecticut Power Co., The	5%	98	*6%	95		100
Dallas Elec. Co. Notes, Jan., 1921	6%	100	*6%			
Dallas Electric Corp. Bonds, 1922	5%	99		.....		.....
Eastern Texas Elec. Co. { Bonds, 1942 Notes, Dec., 1918	5%	92½	*6%	88	5%	60
	6%	100				
Edison Elec. Ilig. Co. of Brockton { Bonds, 1930 Notes, March, 1921	5%	100	No	Pref	8%	160
	5%	100				
El Paso Elec. Co.	5%	99	6%	99	10%	109
Fall River Gas Works Co.	No	Bonds	No	Pref	12%	215
Galveston Elec. Co.	5%	90		.....		.....
Galveston-Houston Elec. Co.	No	Bonds	*6%	75 ^B / _L		25 ^B / _L
Galveston-Houston Elec. Ry. Co.	5%	90	No	Pref		.....
Haverhill Gas Light Co. (Stock par value \$50)	No	Bonds	No	Pref	9%	97
Houghton County Elec. Lt. Co. (Stock par value \$25)	5%	95	6%	23	5%	17
Houghton County Traction Co.	5%	91	*6%	85		40
Houghton County St. Ry. Co., The	5%	100	No	Pref	No	Com

COMPANY	BONDS		PREF. STOCK		COMMON STOCK	
	Int. Rate	Price and Int.	Div. Rate	Price	Div. Rate	Price
Houston Elec. Co.	5%	99 $\frac{B}{L}$		.....		.....
Jacksonville Elec. Co.	5%	96	No	Pref	No	Com
Jacksonville Traction Co.	{ Bonds, 1931 Notes, March, 1919	5% 88 6% 98	*6%	50		20
Keokuk Electric Co.	No	Bonds	*6%	95		.....
Key West Elec. Co., The	5%	72 $\frac{1}{2}$		.....		.....
Lowell Elec. Lt. Corp., The	No	Bonds	No	Pref	10%	215
Mississippi River Power Co.	5%	70 $\frac{A}{B}$		33 $\frac{A}{B}$		9 $\frac{A}{B}$
Northern Texas Elec. Co.	5%	91	6%	85 $\frac{B}{L}$	4%	52 $\frac{1}{2}$ $\frac{B}{L}$
Northern Texas Traction Co.	5%	100	No	Pref		.....
Pacific Coast Power Co.	5%	97	No	Pref	No	Com
Paducah Traction and Lt. Co.	5%	70 L		15 L		5 L
Pensacola Elec. Co.	{ Bonds, 1931 Notes, Jan., 1919	5% 90 6% 99		78		10
Ponce Elec. Co.	6%	100	No	Pref		.....
Public Service Investment Co.	No	Bonds	*6%	80		35
Puget Sound Elec. Ry.	5%	85 B		.....		.....
Puget Sound Power Co.	5%	95	No	Pref	No	Com
Puget Sound Trac., Lt. & Pr. Co.	{ Bonds, 1919	6% 100	*6%	72 $\frac{1}{2}$		24
Railway & Light Sec. Co.	{ First Series, 1935	5% 99	*6%	95 $\frac{1}{2}$	6%	90
	{ Second Series, 1939	5% 99				
	{ Third Series, 1939	5% 99				
	{ Fourth Series, 1942	5% 99				
	{ Fifth Series, 1944	5% 99				
	{ Sixth Series, 1946	5% 99				
Savannah Elec. Co.	5%	68 $\frac{B}{L}$		15		5
Seattle Elec. Co., The	{ 1st Mortgage, 1930	5% 100 B	No	Pref	No	Com
	{ Cons. & Ref., 1929	5% 94 L				
	{ Seattle-Everett, 1939	5% 90				
	{ The Seattle Ry., 1921	5% 100				
Sierra Pacific Elec. Co.	{ Notes, April, 1919	5% 99 $\frac{1}{2}$	*6%	75		5
Tacoma Ry. and Pr. Co.	5%	90	No	Pref		.....
Tampa Elec. Co.	5%	100	No	Pref	10%	126
Whatcom County Ry. & Lt. Co.	5%	90	No	Pref	No	Com

Quotations are approximate. All stocks \$100 par value unless otherwise specified.

*Cumulative. †Ex-Dividend. A. Listed on London Stock Exchange. B. Listed on Boston Stock Exchange. L. Listed on Louisville, Ky., Stock Exchange. N. Common shares have no par value. X. Ex-rights.

LIBRARY NOTES

"Artificial Gas and By-Products in 1915," is the title of a section of *Mineral Resources of the United States, 1915, Part II*, pp. 1031-1060, which we have received in reprint form. Note the tables of consumption and production of various products in the United States, such as coal gas, oil gas, water gas, coke, tar, ammonia, etc., also fuels used in the manufacture of artificial gas.

"Electrical Goods in Cuba," by Philip S. Smith, is the title of *Special Agents Series No. 128* of the Department of Commerce. It discusses in detail various classes of electrical work, and suggests the possibilities of developing the business. Application of electricity to lighting and power plants, especially sugar mills, coke devices and other miscellaneous uses, are taken up.

New York Times Index; A Master Key to All Newspapers. Do not forget that we have it from the beginning, January, 1913. It comes quarterly, the last issue being January-March, 1917. Consult it for the European War in all its phases, for cost of living, for various countries of the world, finances, etc. If a contemporary paper that you refer to does not have an article, then look in the *New York Times* itself, which for the vicinity of Boston is to be found on file at the Public Library, at the Brookline Public Library, Harvard College Library.

"National Hymns" is the title of a convenient 18-page pamphlet issued by the Cathedral Church of St. Paul, Boston, for which persons carrying it off are requested to put five cents in the Dean's box. It contains, "America," "Star Spangled Banner," "Battle Hymn of the Republic," and a dozen others. "Songs of Our Country," published by the National Committee on Patriotic Literature, 461 Eighth Avenue, New York, is another such booklet (\$3.00 a hundred); as also, "Your Flag and Mine."

The "Mechanical World" Pocket Diary and Year Book for 1917, thirtieth year of publication, is a collection of useful engineering notes, rules, tables, and data, at the modest price of forty cents for over 300 pages, with much statistical matter. It is an English publication, and that accounts for the minor cost. Obtainable of The Norman, Remington Company, 308 North Charles street, Baltimore, Md.

LIBRARY OF STONE & WEBSTER

Recent Accessions

(10) Civil, (20) Electrical Engineering

- 304 Annual report of the Dominion Water Power Branch for the fiscal year ending March 31, 1916. Department of the Interior, Canada. Ottawa, 1917. 188p, 7x10, illus, maps. *7203.1916
- 305 Reinforced concrete data. W. W. Bigelow and W. M. Stone. Waltham c1917. 16 sheets, 5½x8½, tables. *0772.B481
- 306 The theory and practice of modern framed structures: Part I. Stresses in simple structures. Part II. Statistically indeterminate structures and secondary stresses. Part III. Design. J. B. Johnson, C. W. Bryan and F. E. Turneaure. New York, 1916. vp, 6x9, illus. *077.J633.Pts.1-3
- 307 Water power available on the Mississippi River at the Rock Island Rapids: the combination of power plants proposed and estimates of the cost of construction and costs. H. S. Putnam. 1917. vp, 7x10, maps. *0732.P983
- 308 Electric power transmission in Iowa . . . Bulletin of the State University of Iowa Extension Division. Bulletin No. 19. Iowa City, 1916. 16p, 6x9. *4200.Un3.0714
- 309 Manual of wireless telegraphy (Radio) for the use of naval electricians. 1915. S. S. Robison. Baltimore, 1915. 243p, 6x9, illus. *0716.R5681
- 310 The "Mechanical World" pocket diary and year book for 1917. Baltimore, 1917. 452p, 4x6. *072.M465.1917
- 311 Standardization rules of American Institute of Electrical Engineers . . . supplement to Pender's handbook for electrical engineers. American Institute of Electrical Engineers. New York, 1916. 117p, 4x7. *071.Am3524s
- 312 A preliminary study of the alloys of chromium, copper and nickel . . . Bulletin No. 93, University of Illinois Engineering Experiment Station. Nov. 6, 1916. 60p, 6x9, illus. *075.I16ac
- 313 Literature of the nitrogen industries, 1912-1916 . . . Helen R. Hosmer. 1917. 40p, 6x9. *074.H794
- 314 The manufacture of sulphuric acid and alkali with the collateral branches . . . George Lunge. London, 1917. 347p, 6x9. *074.L97. Vol.1s

(57) Naval and Military Affairs

- 315 An Act to authorize the President to increase temporarily the military establishment of the U. S. H. R. 3545 . . . April 28, 1917. U. S. Congress. Wash., 1917. 31p, 7½x11. *6800.M623
- 316 Chicago Public Library: Book Bulletin. List of books on military service. Chicago, 1917. 76p, 7x10. *017.C432
- 317 Engineers field manual: Parts I-VI . . . Fourth revised edition with addenda. U. S. War Dept. Wash., 1912. 499+p, 4½x7, diags. *6830.0294m
- 318 Field service regulations. U. S. Army, 1914. U. S. War Dept. Wash., 1914. 224p, 4x6, illus. *6830.0294fs
- 319 Manufacture of artillery ammunition. 1st ed. L. P. Alford (and others). New York, c1917. 765p, 6x9, illus. *0765.A28
- 320 National service: devoted to the cause of universal military training. April, 1917. Published by the Military Training Publishing Corporation. New York, 1917. (67p+), 7x10. *017.M629
- 321 The naval constructor . . . 3d ed. revised, enlarged. George Simpson. 819p, 4½x6½, diags, tables. New York, 1914. *0765.R58

- 322 Report of the Mass. Volunteer Aid Association. Feb., 1917. 52p, 6x9. *1400.017.2/17
- 323 Stone & Webster's office letter regarding present national emergency. April 2, 1917. Stone & Webster. 3p, 8x10½. *600.017
- 324 U. S. Army transport service regulations. 1914. Wash., 1914. 83+p, 4x6. *6830.0294t

(71) Sociological, (73) Sociology

- 325 Bulletin of the Mass. Institute of Technology, Cambridge. Summer course, 1917. Mass. Institute of Technology. Cambridge, 1917. 23p, 6x9. *1461.T22sc.1917
- 326 Bulletin of the Mass. Institute of Technology, Cambridge. Surveying camp. 1917. Mass. Institute of Technology. Cambridge, 1917. 13p, 6x9. *1461.T22s.1917
- 327 Hours, fatigue and health in British munition factories. U. S. Bureau of Labor Statistics. Wash., 1917. 147p, 6x9. *6899.B221
- 328 Fourth annual report for the fiscal year ending Dec. 31, 1916. Mass. Minimum Wage Commission. Boston, 1917. 55p, 6x9. *1400.M664.1916
- 329 Stabilizing industrial employment reducing the labor turnover. Whole No. 160. May, 1917. American Academy of Political and Social Science. Philadelphia, 1917. 245p, 6½x9½. *029.Am35e

(74) Financial, (75) Annual Reports

- 330 One hundred years of savings banking, 1816-1916, including a bibliography on thrift. Edward L. Robinson. 1917. 89p, 5½x7½. *025.R561
- 331 Society of stockholders of gas and electric light properties in Mass. 1917. Lynn, nd. 15p, 5½x8½. *078.Sol3
- 332 Report of the committee on railroad situation. Chamber of Commerce of the U. S. Wash., Dec., 1916. 59p, 5x7. *6800.C35.022
- 333 Fourth annual report of Minimum Wage Commission of Mass. for the year ending 12/31/16. Massachusetts Wage Commission. Boston, 1917. 55p, 6x9. *1400.M664.1916
- 334 Eighth annual report on labor organizations for the year 1915. Bureau of Mass. Statistics. Boston, 1917. 59p, 6x9. *1402.L11.1915
- 335 Thirty-second annual report of the Board of Gas and Electric Light Commissioners of the Commonwealth of Mass.; annual returns for the year ending June 30, 1916. Boston, 1917. 533p, 6x9. *1407.1916
- 336 Weights and measures: eleventh annual conference of representatives from various states held at the Bureau of Standards, Wash., D. C., May 23-26, 1916 . . . Wash., 1917. 193p, 7x10, illus. *6898.W427.1916

(76) Legal

- 337 Inheritance taxes for investors: some practical notes on the inheritance tax laws of each of the States of the United States, with particular reference to their application to non-resident investors. Hugh Bancroft. Boston, 1917. 133p, 5x8. *0318.B22
- 338 Manual of the labor laws: enforced by State Board of Labor and Industries. June, 1915. State Board of Mass. Labor and Industries. Boston, 1915. 129p, 5x8. *1400.L113.03
- 339 Japanese administration and finance. No. 83. March, 1917. Bureau of Municipal Research and Training School for Public Service. New York, 1917. 72p, 6x9. *025.M9252
- 340 The state-wide initiative and referendum . . . Judson King . . . presented by Mr. Owen, March 1, 1917. Document No. 736. U. S. Congress. Wash., 1917. 16p, 6x9. *6800.K583.03
- 341 The Mexican constitution of 1917 compared with the constitution of 1857 . . . Supplement to May, 1917. American Academy of Political and Social Science. Philadelphia, 1917. 116p, 6½x9½. *8600.Am35.03

(77) Public Utilities

- 342 Fourth annual public utilities review. [In] New York Evening Post. March 30, 1917. New York, 1917. 39p, 17x23. V*0231.N48.3/30/17
- 343 Seventh annual report of Board of Public Utilities, city of Los Angeles. July 1, 1915-June 30, 1916. Board of Los Angeles Public Utilities. Los Angeles, nd. 232p, 6x9. *6481.P96.1916
- 344 Digest of Public Utilities reports annotated for year 1916, including Vols. 1916A-1916F. Lawyers Co-operative Publishing Co. Rochester, c1917. 807p, 6x9½. *035.L449d.1916
- 345 Public utility rates . . . 1st ed. Harry Barker. New York, c1917. 387p, 6x9. *036.B243
- 346 Fifth annual number of Poor's Manual of Public Utilities. 1917. Poor's Railroad Manual Co. c1917. 2400p, 6x9. *02.P79pu.1917

(80) Statistics


- 347 Preliminary report, 1915, of the population of Mass. Commonwealth by native and foreign born. [Issued March 7, 1917.] Mass. Bureau of Statistics. Boston, 1917. unpag., 8½x11. *1402.C33f.1915p
- 348 Bolivia: by American minister, John D. O'Rear, La Paz, Feb. 26. [In] Commerce Reports, April 18, 1917. Wash., 1917. 24p, 6x9. *6890.C73.027.Bolivia
- 349 Railway statistics of the U. S. of America for the year ending June 30, 1916: compared with the official reports for 1915 and recent statistics of foreign railways. Bureau of Railway News and Statistics. Chicago, 1917. 147p, 6x9. *022.B896.1916

(90) Sources of Information

- 350 Almanack: containing an account of the astronomical and other phenomena, a vast amount of information respecting the government, finances, population, commerce and general statistics of various nations. Joseph Whitaker. London, 1917. 1048p, 5x7. *09.W58.1917
- 351 Hazell's annual: a record of the movements of the time; giving the most recent and authoritative information on the topics of the day, with copious index. 851p, 5x7. *09.H33.1917
- 352 Harvard University: descriptive catalogue. April, 1917. Harvard University. Cambridge, 1917. 525p, 5x7½. *1445.H26cd.1916-17
- 353 Stone & Webster library system . . . G. W. Lee. New York, 1917. 13p, 7x10. *601.L51
- 354 World convention dates: an authoritative monthly bulletin of advance information . . . March, 1917. New York, c1917. 33p, 9x12. *6999.W893

Miscellaneous

- 355 The banana: its food value and importance as a source of the nation's food supply . . . United Fruit Co. Boston, 1917. 6p, 15x20. *160.Un33
- 356 Causes of death by occupation . . . Whole No. 207. Bureau of Labor Statistics Bulletin. Wash., 1917. 88p, 6x9. *6899.B207
- 357 National hymns. Cathedral Church of St. Paul. Boston, 1917. 18p, 5x7½. *099.C289
- 358 Selected list of books on domestic production and preservation of food . . . Boston Public Library. April, 1917. 13p, 4½x6½. *1461.L61.096d

HDI

HB 1P77 W

